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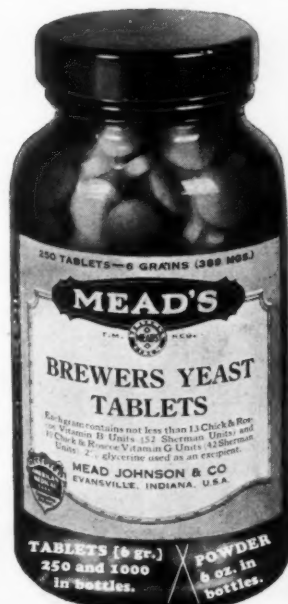
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RETINAL DETACHMENT*

FRANK E. BURCH, M.D.

Saint Paul

NORMALLY the retina is firmly adherent to the underlying pigmented layer of the choroid only at the optic nerve, the macula, and at its anterior limits (the ora serrata) near the equator of the eyeball. Elsewhere the adhesion between the choroid and the retina is not very firm, the retina being more or less supported in its position by the vitreous gel. Detachment takes place as a separation between the rod and cone layer of the retina proper and the pigment epithelium attached to the underlying choroid, i.e., serous fluid collecting in the embryonic space between the two layers.

Wardrop, in 1834, gave us our first description of this condition in the English language. He wrote, "I have had opportunity of dissecting several eyes where a serous fluid had collected between the choroid coat and the retina. In these cases, the retina and vitreous humor were displaced and compressed by a morbid collection of water; the vitreous humor being more or less absorbed, whilst the retina shriveled up, and formed a white bundle." The first description, in English, of surgical treatment for this condition was by MacKenzie, about 1850. He advised simple drainage of subretinal fluid by scleral puncture. In 1864, Bowman, describing a treatment for retinal detachment, stated: "My object has never been to give external vent to fluid, though this has almost always been one immediate effect of my punctures, but rather to open a permanent communication inwards from the subretinal space, under the idea of allowing the infused fluid to escape

into the vitreous chamber rather than to spread further between the retina and the choroid." And so, on and on, during seventy years, with little idea of the exact etiology, the treatment of detachment of the retina was based on wrong principles, consisting largely of prolonged recumbency and elimination. It was exceedingly disappointing from every angle of surgical attack.

Although the ophthalmoscope has been in use for eighty years, and Coccius described retinal tears in 1853, soon after its invention, little or no attention was given to the fact that almost invariably, retinal detachment is associated with a tear or hole in the retinal tissue. Von Graefe considered holes in the retina as incidental to detachment. It was not until 1923, after Gonin of Lausanne stressed the fact that closure of the retinal tear or hole resulted in *cure* of retinal detachment that any successful results have followed treatment. No one paid much attention to his thesis (to be discussed later) until about 1929. My interest in this subject was first stimulated by a very highly respected member of this society—not an ophthalmologist—who, about in 1928, sent me a copy of a *Schweizerische medizinische Wochenschrift* describing a new cure for retinal detachment.

Detachment of the retina is brought about in a variety of ways. When localized inflammatory processes develop in the choroid (the circulatory, nutritional tunic between the retina and the sclera) with secondary changes in the retina itself, there develop points of exudate in the vitreous. These form an attachment between the *vitreous* and the retina. In many affected eyes the vitreous is more or less fluid in character. Undoubtedly,

*Read before the Minnesota Academy of Medicine, St. Paul, November 24, 1934.

traction of vitreous bands upon the retina, often with the aid of some slight trauma is the beginning of a retinal tear. Fluid separates from the vitreous gel, passes through the retinal tear or hole, burrows between the retina and the choroid, and separation results.

The mere existence of a hole or rent in the retina need not necessarily cause a detached retina. In removal of magnetic foreign bodies from the eye by the posterior route, we invariably incise the retina near its equator. If the vitreous is not diseased, healing occurs without retinal detachment or a temporary detachment may subside spontaneously.

Frequently, in so-called idiopathic detachment, gravity plays a part. Especially when the detachment is in the upper quadrant of the eye, separation of the retina from the choroid gradually extends downward until the main collection of subretinal fluid may be in the lower quadrant of the retina. Then the upper portion of the retina may remain as a fairly flat detachment. Detachment of the retina may become quite complete. In complete detachment, the retina may remain adherent only around the optic nerve and macula, and at the equator (ora serrata). The fact that retinal detachment is less common in the young excepting after rather severe trauma, is accepted as further proof that cystic and atrophic degenerations in the retina with advancing age is another contributing factor. In my series of thirty operated cases the average age was forty and one-half, the youngest being sixteen, the oldest seventy-three. The right eye was involved in fourteen instances, the left eye in sixteen. There were fourteen males, and sixteen females. Myopia favors retinal detachment because of the axial elongation of the globe with consequent stretching of all the ocular tunics, together with the fact that in myopia the vitreous undergoes certain nutritive impairment and degenerative changes.

Trauma is a very decided factor. A history of trauma was obtained in about one-third (11) of my patients. The percentage is doubtless higher, for many minor concussions of the eye and head occur and are quickly forgotten. Detachment may be very insidious in development, slight in extent, and may not produce an impairment of vision to a degree that the patient's attention is called to it until it has existed for a

considerable period. This is especially true when the detachment originates in the lower part of the fundus. Thus one is rarely able to determine the exact time when detachment first exists. In my series most of the cases were of recent origin. Many cases have been refused operation for the reason that I believed the outlook too unpromising, the condition having existed for a very long time, being too extensive, or complicated by extreme myopia, cataract, or old age. Some patients refused to undergo operation. Vogt of Zurich, before the Swiss Ophthalmological Society, in May, 1934, reported a case cured after seven and three-quarter years. Vision improved from 1/200 to 5/30.

It was Gonin who was able to prove that retinal holes were present in practically 90 per cent of all idiopathic and traumatic cases, could be found if searched for, and, what was most important, that their closure was the first factor in successful treatment. A variety of holes or tears is found in association with detachment. Sometimes they are mere slits or rents in the tissue. At other times they are found as horse-shoe or arrow-shaped holes. At other times there is a tearing away of the retina from its equatorial attachment at some location and we speak of it as disinsertion, or dialysis of the retina. This type most commonly follows trauma, and the tearing away of the retina is usually below or on the temporal side.

Detachment Without Holes.—It is possible to have retinal detachment without a hole or tear in the retina, and this is the case in the type of detachment we sometimes see with eclampsia and severe toxemias of pregnancy. Here the detachment is doubtless produced by vascular hypertension and toxemia with the formation of extensive choroidal exudates in the retina and between the retina and the underlying choroid. It is a local manifestation of the generalized edema associated with nephritis. In a series of twenty-one cases collected by Fry, 71 per cent were bilateral and in 85 per cent the retina reattached spontaneously, some within a few days.

I was able to follow a case of this type very closely in a patient admitted under Dr. Litzenberg's service at the University Hospital. A young woman, aged 28, was in the eighth month of her third pregnancy. Five weeks previously, her physician noted rising blood pressure, soon

followed by albuminuria and edema of the extremities. Her vision became blurred one week previous and she was practically blind just before admission. A severe eclamptic convulsion occurred the night before her admission. Ophthalmoscopic examination revealed an almost complete detachment in each eye. Her blood pressure was 256/154; the urine: Sp. G. 1032, Alb. 34, many casts of all types, a few red and white blood cells; blood chemistry: CO_2 combining power, 37 per cent, N. P. N. 28.5, uric acid 3.07. She was promptly aborted. From the third to the sixth day after delivery under intensive treatment with urea by mouth, and restriction of fluids, the excretion of fluid practically trebled the fluid intake. Her edema subsided, the blood pressure within ten days returned to normal and there was no albuminuria. Six days after delivery, the detachments in the upper quadrants of the eye had disappeared. On the tenth day there was no evidence of detachment in either eye. The residual retinal hemorrhages and exudates had entirely resorbed within three months, and vision in each eye was 20/30 when the patient last reported.

Likewise one may rarely find detachment unaccompanied by tears or holes in retinal edema with advanced chronic nephritis *not* associated with pregnancy.

I was able to find holes or disinsertions in twenty-three out of thirty cases accepted for operation. Of these, sixteen were in the upper quadrant, only three were below the horizontal meridian, and four were disinsertions or a tearing away of the retina near the equator.

The importance of finding and localizing holes as the *first* principle in the underlying treatment is proven. We have learned that cures are directly proportionate to complete closure or walling off of communication between the vitreous and the subretinal space. Considerable difficulty is sometimes encountered in finding the rent or tear through which fluid separated from the vitreous finds its way into the subretinal space. Folds of overhanging retina which are often undulant and movable, may demand time-consuming, meticulous ophthalmoscopic examination, with the patient in different positions, before they may be discovered. At times complete occlusion of both eyes with the patient recumbent permits the detachment to flatten out; then only

may the opening in the retina be seen. Rarely it is necessary to aspirate or drain away the subretinal fluid before they may be found. Again the hole may be found above, the main prominence of the detachment being below, from the effects of gravity, as previously mentioned.

Our present day basis for successful surgical treatment is premised on three fundamental principles: (1) localization and closure of a retinal tear or hole; (2) drainage of subretinal fluid; (3) induction of a mild choroiditis to secure adhesions between the retina and its pigmented layer. The means of accomplishing these has been an intriguing evolution in technic and has resulted in an increasing percentage of cures, with refinements in the methods employed.

Having found and localized the meridian and estimated the distance from the limbus of the communication between the vitreous and the subretinal space, we consider the means of its closure. Gonin sought to close these holes after exact localization by the introduction of a Pacquelin cautery through the sclera at the site of the hole to produce an adhesion around the edges of the retinal hole to the underlying choroid.

It was my privilege to hear his report upon his results in 100 cases before the International Congress of Ophthalmology, Amsterdam, in 1929. Without having ever seen the operation done, my first case was operated upon by Gonin's method in December, 1931, using the fine electric, instead of the Pacquelin cautery. It was entirely successful. Five patients were subjected to this procedure. In two others a temporary cure was produced. With Gonin's method, few ophthalmic surgeons could duplicate his results. In the first place, it traumatized the retina considerably. It damaged the vitreous. It seems logical to conclude that further adhesive bands in the vitreous must form after this procedure. It is not applicable as a one-operation procedure where more than one hole existed, as is frequently the case. It is often difficult to exactly localize the hole, topographically, upon the sclera, because the retina is separated from the sclera by several millimeters of subretinal fluid. This was the difficult thing about Gonin's single cauterization method.

After Gonin's writings upon this subject, almost immediately the Vienna school of ophthalmologists, partly in view of the fact that the

hole or rent could not always be found and exactly localized, and partly to lessen the trauma to the delicate retinal tissue and the vitreous, devised a substitute procedure. This so-called Guist-Lindner operation consisted of laying down a barrage of trephine openings in the sclera, without penetrating the choroid or the retina, around the hole or tear when found. When no hole could be found, an extensive barrage of trephine openings was made through the sclera down to the choroid, over the most prominent part of the detachment well behind the equator. Chemical cauterization of each of these 1.5 to 2 mm. trephine openings with potassium hydroxid, quickly neutralized with dilute acetic acid, was done to induce an adhesive process between the choroid and the retina, finally perforating the choroid to allow escape of the subretinal fluid. This method was entirely successful in inducing choroiditis around the hole or where it was presumed to be. After the escape of the subretinal fluid through the special opening, the retina, coming in apposition with the choroid, became adherent to it. Fluid then could no longer traverse the opening and secure access to the so-called subretinal space, lifting the retina from its base.

The Guist-Lindner method proved to be a very laborious procedure. Sometimes the trephine perforated the choroid, the subretinal fluid escaped, and the operation had to be abandoned because of the difficulty of trephining the sclera after the intraocular tension was thus lowered. The method never appealed to me after seeing it done. Therefore, in my second series of cases (seven in number) employing the cautery at dull red heat, I sought to induce an adhesive choroiditis with a barrage of cauterizations just going down through the sclera, also without perforating the choroid until after completion of the barrage. Then I punctured the choroid to permit drainage of the subretinal fluid to allow the retina to drop back against the choroidal coat. In this series of seven cases, four were entirely successful, one was improved, and two were not improved. No unfortunate sequelæ followed with any of these patients.

In 1930, Sven Larsson of Stockholm and Weve of Utrecht studied the possibility of diathermy as a means of adequately controlling the induced exudative choroiditis without risk of damage to the retina itself, or to the vitreous. Larsson's method was a type of surface diather-

my applying a small $\frac{2}{3}$ mm. ball electrode against the dried sclerotic over the detached detached retina in several places, employing a 50 M. A. current for five seconds. This was followed by drainage of the subretinal fluid through a trephine opening. One of Larsson's objectives was to be able to ignore the hole or tear, at the same time minimizing the danger of hemorrhage. He secured approximately 50 per cent of cures. Weve employed the surface electrode, and also made multiple micropunctures with fine needles encircling the entire vicinity of holes or tears which were carefully localized, finally cauterizing a larger opening to drain the subretinal fluid. [Drainage of the subretinal fluid constitutes an important principle in the success of surgery for retinal detachment. It must be adequate to permit contact between the retina and the choroid.] Finally, Weve abandoned surface diathermy resorting to needles only, the time of current application being judged by the eschar effect on the scleral surface, usually only a few seconds.

Finally, in order to overcome the objections to the Gonin, the Guist-Lindner, and the Larsson-Weve technic, Safar of Vienna devised a type of needle 1.5 mm. long for penetrating the sclera and fulgurating the choroid while the subretinal fluid was retained, thus preventing contact with the retina. A high frequency current of 30 to 50 milliamperage is used for only a second, permitting a fairly uniform induced choroiditis. The micropunctures are distributed in a manner to seclude a hole or tear in, or disinsertion of, the retina. The advantage of a barrage of micropunctures, using very short needles around the opening, induces practically no trauma to the two very important structures involved, namely, the retina and the vitreous. Frequently, 20, 30, even 40 micropunctures are made, dividing a muscle freely when necessary, and later reattaching it, in order to cover the necessary field. In the case of a disinsertion, I have on occasions laid down a barrage of micropunctures over an arc covering half of the globe, i.e., from the equator at one point to a position on the equator on the opposite side. After this barrage, a single free opening is made as nearly as possible over the site of the tear to permit adequate escape of the subretinal fluid, and this is done after the tiny needles, each of which has a thread attached to it, are withdrawn. Special iridoplatinum needles and a more delicate special high frequency ap-

paratus were designed by Dr. Clifford Walker of Los Angeles, and these are now quite standardly used in this country. The needles are placed at points in the sclera about 2 to 3 mm. apart, endeavoring to encircle the retinal hole or holes or disinsertion. Because of their shortness and their method of application with the aid of silk thread, it is found that holes can be encircled much farther back toward the posterior pole of the globe than with the needles designed by Safar.

The Walker diathermy needles, such as I have used almost exclusively, do not produce any visible scleral necrosis. Animal eyes examined after diathermy show no appreciable damage to the sclera. Ordinarily the retina is untouched, because it is separated from the choroid by subretinal fluid until the fluid is drained.

The choroid is fulgurated for a zone of 1 to 2 mm. around the point of the needle, depending upon the milliamperage employed. The usual inflammatory reaction occurs with exudation through the pigment layer, resulting in chorioretinal adhesion over the soft scars in the choroid. The retinal degeneration which occurs is largely confined to the adjacent rod and cone layers; the increase in the visual fields is the best evidence of restored function. The all-important macular area is usually successfully reclaimed, when involved.

Seventeen patients have been operated upon by the Safar-Walker method, twelve of these are perfect results today; two are too recent to include, but apparently reattachment of the retina is safe; two were total detachments of the retina and the operation was a failure; in these two no holes could be found. In one other case in which no hole was found, the result is an improvement but it is not a complete reattachment.

Again emphasizing certain surgical principles in the operation for detachment of the retina: (1) the presence and as nearly as possible the exact localization of a hole, or holes or tears; (2) the induction of an adhesive choroiditis of mild degree *around* these openings with a minimum of trauma; (3) the release of subretinal fluid sufficient to procure ample drainage and permit recontact of the retina and the choroid; (4) a perfect local anesthesia. For this one must use a retrobulbar novocaine injection.

The causes of failure are chiefly too old or too extensive a detachment, non-coöperative pa-

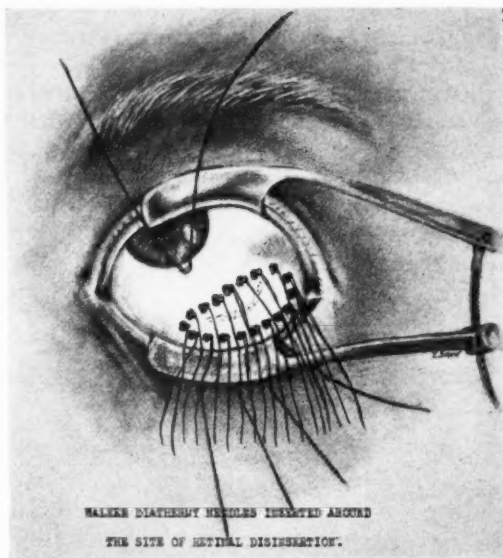


Fig. 1.

tients, hemorrhage, failure of the reattached retina to adhere, cataract, or aphakia following cataract, iridocyclitis, nystagmus, very old persons who cannot be kept quiet over long periods, various other degenerative changes in the eye. Three of our patients were very uncoöperative. The result was perfect in one of these in spite of himself; the other two were failures. Usually three weeks is a minimum of absolute quiet in bed in a position most favorable for reattachment of the retina. Finally, complete occlusion of both eyes during this period, thorough cycloplegia in the operated eye for a prolonged period with the use of peephole spectacles to limit ocular excursions for a still longer period during convalescence. Finally, a very quiet life over a period of many weeks after discharge with precautions to avoid recurrence. Our oldest case is now a three year cure. There have been only three redetachments where firm reattachment had been secured, one following severe coughing, another after a fall, one unexplained. Since employment of diathermy in our last seventeen cases, thirteen patients left the hospital with good reattachments. One later had a fresh detachment not involving the original area. Three are still in bed, and two of these are, thus far, good, promising prospects for permanent cure. The total of twenty-nine cases gives seventeen successes (59 per cent) remaining attached to date.

GASTRITIS, A PHENOMENON OF PYLORIC OBSTRUCTION AND ITS RELATION TO DUODENAL ULCER*

WALTMAN WALTERS, M.D., and GERALD T. CHURCH, M.D.

Rochester, Minnesota

A STUDY of the medical literature of the last decade, referring to studies on duodenal and gastric ulcer, resolves itself into a discussion of sub-total gastrectomy versus gastro-enterostomy, or pyloroplasty,^{3,4,5,10} and of the relation of gastritis to duodenal and gastric ulcer.^{2,7,8,9,18,19,20} For the sake of comprehension it is best to review the events which led up to the decision by certain European surgeons, particularly those of Germany and Austria, to advise and carry out subtotal gastric resection in the treatment of duodenal ulcer. Subsequent to the war, it was the experience of German surgeons that gastrojejunal ulcer was occurring in a much greater percentage of cases than had been apparent previously.³ They found the incidence to vary in different German clinics from 10 to 30 per cent following gastro-enterostomy.^{5,10,14,17} By substituting subtotal gastrectomy for gastro-enterostomy, certain of the German and Austrian surgeons found that they were able to reduce the incidence of recurring ulcer to approximately 1 to 2 per cent.^{5,10,14} After employing subtotal gastrectomy in a large series of cases Finsterer, of Vienna, presented his material before various medical societies in the United States, in 1922, advocating use of the operation as a routine in the treatment of duodenal ulcer. About this time reports were appearing in the literature from other German surgical clinics, noteworthy among which was a report from Kiel by Anschütz and Konjetzny, and by Puhl,^{8,15} of the constant finding of various degrees of gastritis in all specimens of stomachs removed during the course of subtotal gastrectomy for duodenal ulcer. Konjetzny's⁷ monograph on this subject is an outstanding contribution to the medical literature on gastritis.

The finding by these observers, and by others in Germany, of associated marked inflammatory changes in the walls of the stomach, associated with duodenal ulcer, led to the conclusion that

gastritis preceded the development of duodenal ulcer, and it was but a step beyond this for them to reason that it was one of the etiologic factors in the development of duodenal ulcer. However, the etiology of gastritis continued to remain a speculative problem. Accepting the work of the German surgeons as being applicable to patients of other nationalities, Berg and Lewisohn, finding a larger percentage of gastrojejunal ulcers among their patients subsequent to gastro-enterostomy than had been reported from other surgical clinics in the United States, began performing subtotal gastrectomy in the treatment of duodenal ulcer. On various occasions during the past ten years they have reported that, by using this procedure, they have reduced the incidence of gastrojejunal ulcer among their patients from a proved 16 per cent, which it had been previously following gastro-enterostomy, to approximately 1.5 per cent.^{4,10} Although such procedure was advocated by them and by some few other American surgeons, significant pathologic studies of the specimens removed were not reported until lately² and hence, in order to obtain information for comparison of the groups of cases on the basis of the pathologic nature of these lesions as compared with those encountered by German surgeons operating in Germany, Snell and one of us (Walters) made a study of this problem, in 1931, the results of which have been the foundation of several publications.^{18,19,20} To summarize our studies, we found gastritis associated with duodenal ulcer to be an almost constant finding in the specimens removed at operation in various German surgical clinics during the time when we visited them in 1931. The same was true of an unselected group of specimens previously removed by Schmieden at Frankfort, by whose courtesy we were able to make pathologic studies.

As it was our impression that gastritis was absent in most cases of duodenal ulcer in which operation was performed at The Mayo Clinic, careful, detailed, pathologic studies were made of

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Thesis presented before the Minnesota Academy of Medicine, St. Paul, October 10, 1934.

specimens of stomach removed in the course of gastric resection at the clinic to determine the incidence and degree of gastritis associated with duodenal ulcer. In few of the specimens we examined was there gross evidence of gastritis, and when it was present it had been so reported.¹⁸ However, in view of the fact that the question arose in a recent paper by Aschner and Grossman regarding the presence of gastritis, which had not been apparent grossly in some of their cases, but had been found on microscopic examination, we, assisted by Dr. Wellbrock, examined microscopic sections of tissue removed from various parts of the stomach in a group of cases of duodenal ulcer in which gastric and duodenal resection had been performed.

The series studied consisted of twenty-seven cases in which, during the course of removal of certain duodenal ulcers, it seemed advisable to perform partial gastrectomy. These were cases of recurrent ulceration, of duodenal ulcer complicated by repeated and serious hemorrhages, and of high gastric acidity in which the duodenal lesion was such that the procedure could be carried out without undue risk to the patient. The group of cases is small, but it was felt that certain determinations as regards pathologic changes and clinical progress should be made in comparison with cases in which gastro-enterostomy or pyloroplasty had been performed. The specimens were reexamined grossly. In three of the twenty-seven cases, gross evidence of inflammatory change was present; in two of these specimens, diffuse hemorrhagic gastritis was present, with zones of ulceration in the gastric mucosa and, in the third, changes were even more marked and consisted of inflammatory changes and large serpiginous ulcerations. The other twenty-four specimens exhibited what appeared to be normal gastric mucosa.

The resected portions of stomach that were studied were opened along the greater curvature. As the most marked gastritis has been reported to occur along the lesser curvature, sections were cut approximately 3 cm. from the pyloric and cardiac ends of the specimen, on the lesser curvature, and from any intermediate region that appeared to be suggestive of inflammatory change. Care was taken not to section too near primary ulcerations and to avoid the line of resection near the cardia, in which trauma from the application of clamps could be a factor in

mucosal change. Microscopic examination revealed normal structure in twenty-one of the twenty-four specimens which grossly had appeared to be normal. In these twenty-one specimens the mucous lining, crypts, and glands were normal. Microscopic erosion was not present; the interstitial tissue revealed no increased lymphatic hyperplasia and there was no infiltration of polymorphonuclear leukocytes. The other three specimens exhibited a mild inflammatory reaction, graded 1, in all of the sections cut and studied. Mucus, evidence of inflammation, was present on the tips of the villi. Lymphatic hyperplasia, slight edema, and mild lymphatic and polymorphonuclear leukocytic infiltration in interstitial tissues also were present.

It is of interest that six cases of recurring ulceration were studied in the entire series. In five of these gastro-enterostomy had been followed by resection of the gastro-enteric stoma for gastrojejunal ulcer; in the other case, pyloroplasty had been performed before resection. Duodenal ulceration had recurred and the ulcerated portion was removed, together with portions of the duodenum and stomach. In any group of cases of recurrent ulcer a high incidence of gastritis might be expected, yet, in this group, four of the six specimens were normal on gross and microscopic examination, and one was normal on gross inspection but was included in the group of three cases in which there was evidence of mild inflammatory change on microscopic examination. The specimen in the other case of recurrent ulcer following pyloroplasty revealed gross and microscopic evidence of diffuse gastritis. In this case the recurring duodenal ulcer in the anastomosis that had been made at pyloroplasty had produced pyloric obstruction.

It would seem, therefore, that we had obtained proof of a difference in pathologic changes associated with duodenal ulcer in the two groups of patients, namely, those operated on in Germany and those operated on at The Mayo Clinic.* With the infrequent occurrence of gastritis in our cases, it would seem that gastritis as an etiologic factor in the development of duodenal or gastrojejunal ulceration is not of great

*We believe, in this connection, it is of interest to note that Sebenius,¹⁸ of Frankfort, who spent six months at the clinic, came to a decision similar to ours, namely, that gastritis occurred infrequently among patients with duodenal ulcer who had undergone operation at the clinic as contrasted with the almost constant presence of associated gastritis among patients operated on in Schmieden's clinic.

importance; surely its presence was not necessary for the development of duodenal ulcer in our cases.

Gastritis, a Phenomenon of Obstruction

One might speculate at length as to why gastritis occurred among patients in Germany and

A similar phenomenon of associated inflammation due to obstruction is well recognized in acute obstructions of the cystic duct by stone which result in hydrops of the gallbladder, with marked inflammation of its wall (Fig. 1). We have recently seen ulcerating lesions in the mu-

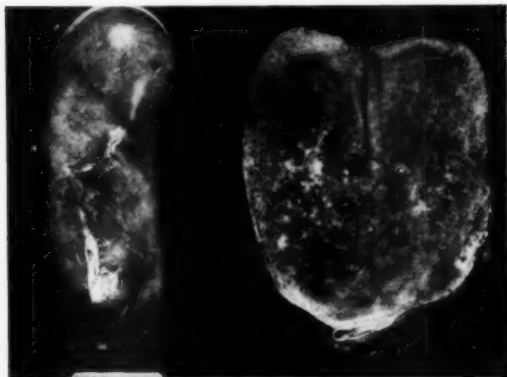


Fig. 1. Hemorrhagic inflammation of wall of gallbladder, the result of obstruction of the cystic duct by stones.

not among those operated on in Minnesota. Differences in climate, habits of living, and nutritional states may play important parts in the problem. A similar difference in incidence in certain other types of lesions customarily treated by surgical procedures is apparent in different parts of this country, such as in cases of goiter, but there are certain factors, we believe, which will explain the development of gastritis among patients in Germany. Among these are the relatively late periods in the course of duodenal ulcer at which the German patient is operated on, and the apparently greater extent of duodenal ulceration among German patients. It was not uncommon to see, among German patients, duodenal ulcers of large size which had produced marked degrees of obstruction of the duodenum and had penetrated into surrounding structures. That such ulcers are entirely the result of delay in treatment, we are inclined to question very much indeed. The fact remains, however, that German patients had a much more severe degree of duodenal ulceration than those we are accustomed to see in The Mayo Clinic.

In speculating on this problem it occurred to us that, with large ulcers of this type producing pyloric obstruction, hypertrophy of the gastric wall, with edema and inflammation, might result.



Fig. 2. Portion of stomach resected for obstructing carcinoma of the pylorus; hemorrhagic gastritis is apparent throughout the gastric mucous membrane.

cous membrane of the gallbladder in a case of obstructive jaundice due to a malignant lesion of the pancreas, and this, too, in the presence of an alkaline fluid. Returning, however, to the idea that gastritis might be a phenomenon of obstruction, it occurred to us that it would be worth while to remove sections of the stomach for microscopic examination when pyloric obstruction was present, both in cases of benign and malignant disease, and to contrast them with other cases in which pyloric obstruction was not present.

Gastritis Associated With Obstructing Carcinoma of the Pylorus

In reviewing our cases of duodenal ulcer in which ulcerative or hemorrhagic gastritis was associated, it was noted that the duodenal ulcer was producing a considerable degree of duodenal de-

tients were males, the ages varying from forty to seventy-seven years (Table I). In seven of the twelve cases the history of dyspepsia was of less than nine months' duration and the longest history was of thirty years' duration. In all of these cases vomiting had been a marked symptom, and

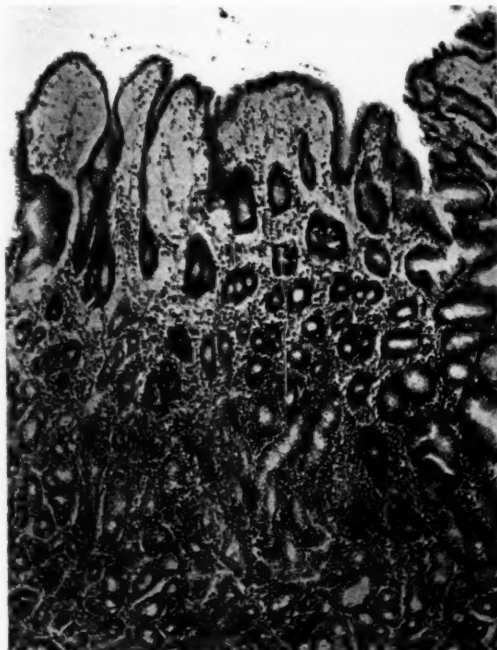


Fig. 3. Portion of gastric wall of patient with pyloric obstruction due to carcinoma. Evidence of gastritis may be noted throughout gastric wall by presence of a large number of leukocytes ($\times 60$).



Fig. 4. Hemorrhagic gastritis secondary to obstructing carcinoma of the pylorus ($\times 60$).

formity or stasis and that gastric retention was apparent clinically. We also had observed in many cases of obstructing carcinoma of the pylorus that thickening and edema of the gastric walls occurred proximal to the obstructing lesion. This led to the supposition that these changes in the stomach were inflammatory and the result of the pyloric obstruction. The interior of the stomach in these cases had the edematous, hemorrhagic appearance of gastritis. Following partial or subtotal gastrectomy, sections were removed from various parts of the resected stomachs; these were examined microscopically in twelve cases of obstructing carcinoma of the pyloric end of the stomach and revealed gastritis in eleven cases, or 92 per cent (Figs. 2, 3 and 4).

Interestingly enough, eleven of the twelve pa-

marked degrees of gastric retention were demonstrated in most of the cases by gastric analysis. Free hydrochloric acid was present in nine of the twelve cases and was absent in two; in one case determinations of gastric acidity were not made.

Gastritis Associated With Nonobstructing Carcinoma of the Pylorus

In view of the finding of the high incidence of gastritis associated with obstructing malignant tumors of the stomach, it seemed advisable to study a control series of twelve cases of carcinoma of the stomach in which obstruction was not present (Table II). In all of these cases the malignant nature of the lesion was demonstrated by microscopic examination after its removal by

GASTRITIS—WALTERS AND CHURCH

TABLE I. CARCINOMA OF THE STOMACH WITH PYLORIC OBSTRUCTION

Number	Case		Duration of symptoms	Duration of retention vomiting*	Gastric acidity			Operation	Situation of lesion	Microscopic examination gastritis graded
	Age, years	Sex			Combined acids	Free hydrochloric acid	Gastric content, c. c.			
1	40	M	1½ years		60	50	300	Posterior Polya	Pylorus	Negative
2	67	M	3 months	1 month	30	16	800	Posterior Polya	Pylorus	2
3	48	M	3 months	3 months	18	0	1,200	Posterior Polya	Pylorus	2
4	64	M	4 years	**	20	12	375	Posterior Polya	Pylorus	1
5	63	M	5 months					Posterior Polya	Pylorus	1
6	55	M	8 months		34	8	410	Posterior Polya	Pylorus	Subacute
7	70	M	6 months	2 weeks	56	0	600	Posterior Polya	Pylorus	1
8	64	M	2 months	6 weeks	22	10	750	Posterior Polya	Pylorus	1
9	71	M	3 months	3 months	64	14	3,020	Billroth II	Pylorus	Acute
10	77	F	30 years	1 month	50	20	950	Billroth I	Pylorus	Chronic
11	50	M	10 years		52	26	620	Posterior Polya	Pylorus	2
12	58	M	4 years		60	42	200	Billroth I	Incisura (2 cm.)	e

*Retention vomiting present in all cases.

**Grade 2.

TABLE II. CARCINOMA OF THE STOMACH WITHOUT PYLORIC OBSTRUCTION

Number	Case		Duration of symptoms*	Gastric acidity			Operation	Situation of gastric lesion	Microscopic examination gastritis graded
	Age, years	Sex		Combined acids	Free hydrochloric acid	Gastric content, c. c.			
1	68	M	1 year	48	36	150	Posterior Polya	Lower curvature	
2	43	M	2 years	56	40	150	Posterior Polya	Pylorus	Negative
3	49	M	5 months	6	0	30	Posterior Polya	Pylorus	2
4	46	M	30 years	82	72	160	Posterior Polya	Lower third	Negative
5	69	M	18 months	20	0	42	Total gastrectomy	Upper third	1
6	80	M	5 years	4	0	35	Posterior Polya	Middle portion	Negative
7	67	M	1 year	34	26	150	Posterior Polya	Upper third	Negative
8	70	M	15 months				Billroth I	Middle and upper third	Negative
9	63	F	2 years	24	12	100	Posterior Polya	Pylorus (5 cm.)	Negative
10	49	M	1 year	58	44	80	Posterior Polya	At angle (3 by 3 cm.)	Negative
11	40	F	8 months	54	40	90	Posterior Polya	High on posterior wall	Negative
12	52	M	2 months	48	28	70	Posterior Polya	Upper third (2.5 by 2.5 cm.)	Negative

*Retention vomiting was absent in all cases.

partial gastrectomy. The lesions measured from 1 to 3 cm. in diameter. Grossly, gastritis did not appear to be present except within a radius of 1 cm. of the lesion. This was borne out on microscopic examination of specimens removed from various parts of the stomach in ten, or 83 per

cent, of the twelve cases. The ages of patients in this group were similar to those in the other group, ranging from forty to eighty years. There were ten men in this group. Similarly, free hydrochloric acid was present in eight of the twelve cases, and a history of dyspepsia varied from two

months to two years, although one patient gave a history of having had gastric dyspepsia for thirty years, and another for five years.

Experimental Production of Gastritis by Obstruction of Pylorus

Working, therefore, on the hypothesis that gastritis is a phenomenon of pyloric or duodenal obstruction, Dr. Church and I have been attempting to produce lesions of gastritis in animals. The method employed consists in partial obstruction of the pyloric end of the stomach by constricting fascial bands. In half of the dogs in the group, gastric secretion was stimulated by administration of histamine. Work on these experimental problems is in too early a stage to allow any definite decision to be reached regarding the efficiency of our method of producing partial pyloric obstruction. It is our hope, however, that we may be able, by one method or another, to produce lesions of gastritis subsequent to the formation of pyloric obstruction, and also to determine whether or not relief of the obstruction by gastro-enterostomy will cause the gastritis to disappear.

While we were studying this problem, Dr. Dragstedt, of Chicago, presented in a Mayo Foundation lecture some interesting data on experimental production of peptic or, as he called them, acid ulcers of the stomach. As a complete report of these studies undoubtedly soon will be published by him, we feel that only the briefest reference to his material should be made at this time. By producing, experimentally, an isolated gastric pouch, he obtained pure gastric juice from it through a metal cannula. By closing the cannula, obstruction to the flow of gastric juice from the pouch resulted in development of chronic, progressive perforating ulcers, anatomically similar to clinical lesions. Quoting from Dragstedt: "In one experiment in which pneumonia occurred forty-eight hours after operation, several superficial ulcers were found and the entire mucous membrane presented numerous small hemorrhagic erosions." Our interpretations of his deductions are that ulcerations of the stomach and duodenum are produced by the irritating action of pure gastric juice, with a concentration of free hydrochloric acid of fifty units or more (between 0.1 and 0.15 per cent) on a gastric wall, the physiologic function of which is interfered with as a result of obstruction.

This contribution of Dr. Dragstedt's appears to us to be of outstanding value. It lends further support to the work of Mann,^{11,12,13} Bollman and others, who previously have emphasized the importance of the acid factor in the production of experimental gastric and duodenal ulceration. It supports directly our own contention that gastritis is a phenomenon of pyloric or duodenal obstruction, but further, and from a practical standpoint, it would lead to the conclusion that any reduction in the incidence of gastrojejunal ulceration obtained by subtotal gastric resection, under and below that following gastro-enterostomy, is due to a greater reduction of gastric acidity occurring subsequent to subtotal gastrectomy.

Summary

In microscopic examination of specimens removed from stomachs resected during the course of operations for duodenal ulcer, associated gastritis was found in but few instances. In studies made of obstructing gastric lesions, it appeared that gastritis occurred in association with pyloric obstruction in a high percentage of cases and was absent when pyloric obstruction was not present. To confirm this clinical impression, a group of cases in which there were obstructing carcinomas of the stomach was studied, and microscopic evidence of gastritis was found in 92 per cent of the cases. A study was made of a control group of patients who had carcinoma without obstruction, who were of similar age and distribution by sex, and whose symptoms were of similar duration. Gastritis was absent in 82 per cent of cases. Studies are in progress at the present time, to determine whether gastritis can be caused experimentally, by producing various degrees of pyloric obstruction with fascial bands.

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PATHOLOGIC FACTORS IN THE CURABILITY OF CARCINOMA OF THE COLON*

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LITERATURE regarding malignant lesions of the bowel has been abundant and it is doubtless true that hardly a phase of this disease has been neglected by writers at some time or other. What is to be added to the already voluminous publications on this subject seems to be justified from the standpoint of further describing and elaborating upon some of the pathologic factors which bear a relation to the curability of this dreaded disease.

A number of studies have been made in which it has been shown that grading of the degree of malignancy of tumors is of considerable importance in determining prognosis as to duration of life, incidence of metastases, radiosensitivity of the tumor and extent of the lesion. These data are not of as much value in the forecasting of events in any one case as in their application

to a large group. There are so many exceptions to the rule that prognostication in individual cases is not possible. This is more or less true for all malignant lesions regardless of their location, but is especially noticeable for carcinoma of the colon, where the grading of the tumor as to its degree of differentiation seems to be of somewhat less relative value and possibly of less importance; consequently other data must be taken into consideration in determining the type of treatment indicated as well as the eventual outcome of the disease. This fact is well illustrated in a case reported by Raiford in which local excision only of skin nodules from a highly malignant epitheliomata of the anus resulted in a seven year cure.

Influences which modify the prognosis in cases of carcinoma of the bowel may be grouped (Rankin and Olson) into extrinsic and intrinsic factors as follows:

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CARCINOMA OF THE COLON—LARSON

I. Extrinsic

1. General

- Age of patient
- Loss of weight
- Anemia
- General debility
- Cardiovascular and renal impairment
- Coexisting chronic debilitating diseases such as diabetes and tuberculosis
- Duration of growth
- Direction of growth
- Glandular metastasis
- Lymphocytic infiltration
- Fibrosis
- Hyalinization

2. Local

- Size
- Fixation
- Perforation: with or without abscess or formation of fistula.

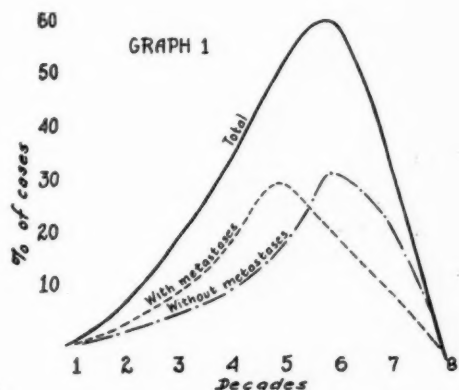
II. Intrinsic

1. Activity of the neoplastic cells, especially their ability to differentiate or approach the normal state.

At the head of the list of extrinsic influences stands that of the age of the patient and in the determination of prognosis this factor probably has practically as much bearing on the eventual outcome as that of degree of malignancy. Rankin emphasized this in stating that "young tissues so potent in resistance to acute fulminating infectious processes are helpless to withstand the formidable offense of cancer. Their vital elasticity and resilience is far less hostile to neoplastic invasion than that of the tissues of senescence." This was adequately proved in a series of 753 cases in which he showed that the total good results in young individuals were 50 per cent less and the total poor ultimate results 20 per cent more than in a group of patients of all ages taken together. In the following data the importance of the significant influence of age is again borne out.

The age of the patient, however, is not the all-important factor in determining the prognosis. If it were, biopsy of malignant lesions, such as those of the anus, rectum and rectosigmoid would be practically valueless, whereas this is one of the most indispensable of any of the diagnostic procedures. Many times the outcome of the biopsy determines whether or not surgical measures, radiotherapy, or a combination of both is to be employed, because when adequate knowledge of the morphologic characteristics of a tumor is known, its histogenesis, degree of malig-

nancy, metastasizing power, and radiosensitivity can be estimated with more than a fair degree of accuracy. In this connection it should be remembered that radiosensitivity must be differen-



PERCENTAGE OF CASES WITH AND WITHOUT METASTASES BY AGE GROUPS

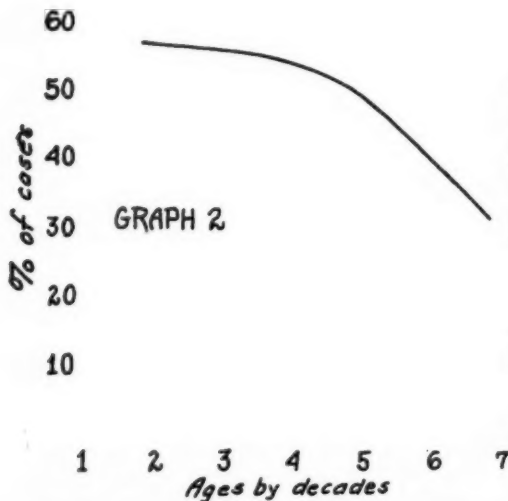
tiated from radiocurability. The highly undifferentiated lesions, or those of high degree of malignancy, melt away rapidly under radium therapy but they recur early and persistently as well as possess a strong tendency to metastasize widely in a relatively short time, so that they kill with just as great or even greater frequency than tumors which are spoken of as being radioresistant.

In order to elaborate upon the factor of age as an influence in the prognosis of carcinoma of the colon, a series of 210 consecutive cases of this disease in which there were complete necropsy data were taken from the records of the Department of Pathology, the University of Minnesota. In this group of 210 cases there were seventy-seven in which there were absolutely no metastases or extension of the growth to be found at postmortem examination. Of the cases with metastases there were an additional thirty-six in which there was a limited extension of the growth or only a few small regional glands involved, so that it would seem that a reasonable chance existed that the lesion was probably an operable one. The remaining ninety-seven cases represented instances in which there was extensive fixation, distant metastasis, or otherwise a locally inoperable lesion.

The age incidence of the various groups is

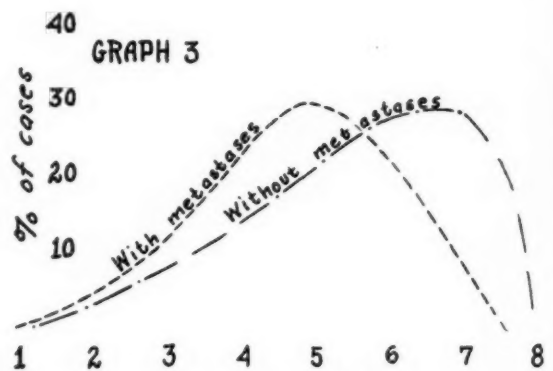
plotted in Graph 1. The number of cases in the first three decades is too small to justify conclusions. However, beyond the fourth decade, the number is large enough to warrant important de-

The fact that malignant tumors grow more rapidly in young patients must be accounted for either on the basis of a difference in the properties of the host itself, or on variations in struc-



PERCENTAGE OF CASES AT VARIOUS AGES PRESENTING METASTASES

ductions. Those patients in the younger age groups have a definitely greater incidence of metastases than those in the older groups. The peak of the incidence of cases where metastases are present is approximately one decade earlier than where none are present; in other words an individual at the age of sixty who harbors a malignant lesion of the colon has a much better chance of operability, other factors being equal, than one at the age of fifty. This fact is again shown in Graph 2, which shows the percentage of cases at various ages presenting metastasis. The tendency to slow growth in an elderly individual is further emphasized in Graph 3 in which the untreated cases are illustrated. This group of cases represents all patients who died from carcinoma of the large bowel without surgical intervention, radiotherapy, or other forms of treatment undertaken to cure or palliate the disease. In this graph the peak of incidence of those cases without metastases comes in the seventh decade, indicating a slower growth. Those with metastases reach a height of incidence in the fifth decade, again emphasizing the point that metastases are much more frequent and that growth is more rapid in younger patients.



INCIDENCE OF UNTREATED CASES BY DECADES

ture of the tumor. Whether one or both of these two factors are responsible is a disputed issue. However, one point has been pretty definitely shown by Shields and Warren in their review of 5,052 epidermoid carcinomata in which they found that the relative frequency of grades of malignancy remained the same in each age decade. This would seem to indicate a relatively less importance of the structure of the tumor as compared to the resistant properties of the tissues of the host, and from the figures shown above there would seem to be convincing evidence that the resistance of the host directly increases as the patient grows older.

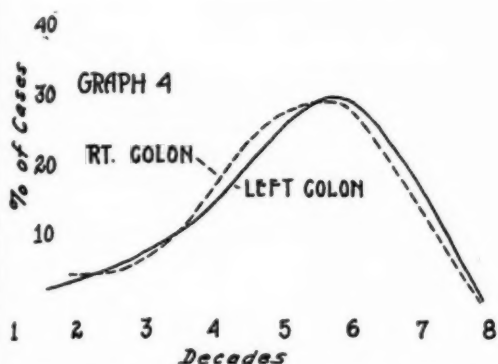
In Graph 4 the incidence of lesions in the right and left colon according to age is plotted. It indicates no essential difference in the incidence of right or left colon lesions, except possibly a slightly younger age group for lesions of the proximal large intestine. This can hardly be considered significant since it is so slight, yet it does confirm an old impression that malignant lesions in the very young are frequently located in the right colon. In Graph 5 the percentage of lesions in various portions of the large intestine is plotted according to the exact anatomical location of the lesion, and illustrates graphically the preponderance of cases occurring at the two extremities of the colon, with a definitely lower number in the mid-portion of the large gut. There

CARCINOMA OF THE COLON—LARSON

is also plotted in this same figure the relation of incidence of metastases to the location of the lesion. According to these figures, there is no significant difference in the percentage of metas-

with opaque enemata are available, or preliminary exploration has been carried out.

2. *Obstruction.*—Another local factor of tremendous importance is the degree of obstruction

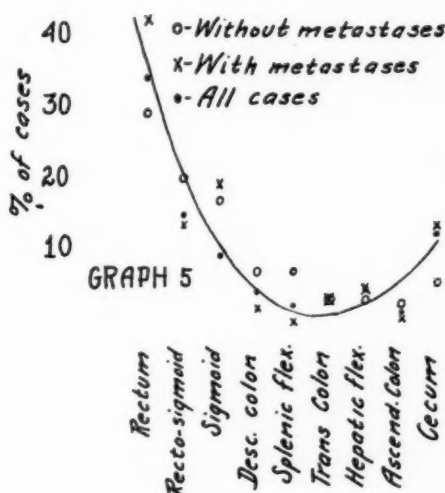


INCIDENCE OF LESIONS OF RIGHT AND LEFT COLON ACCORDING TO AGE

tases no matter where the primary lesion is located, with the possible exception of the cecum and ascending colon. This series of cases is not large enough to be of great value but does show that possibly a relatively fewer number of cases present metastases when the primary lesion is in this portion of the gut. The reason for this is not clear but it is a fact which is well known to surgeons, since cures in carcinoma of the right colon are somewhat more frequently obtained than in lesions of the left colon and rectum (Rankin).

Other local factors are of considerable importance in determining the type of therapy as well as the prognosis in cases of carcinoma of the large intestine, and must not be lost sight of in the management of this disease.

1. *Location of tumor.*—It is axiomatic that an accurate diagnosis as to the location of the tumor must be made and this is especially true of lesions in the distal colon. Whether a tumor is located in the rectum, rectosigmoid or sigmoid makes a tremendous difference in the surgical maneuver to be carried out, because of the difference in accessibility, in extension of the lesion and in the location of metastases. In the remaining segments of the large intestine, localization of the tumor can be done fairly accurately since in practically all instances either roentgenograms



INCIDENCE OF LESIONS OF COLON ACCORDING TO LOCATION

produced by the tumor. In the left colon obstruction is an early accompaniment, and is due to a number of factors. Growths in this location are more likely to be of the annular type, the diameter of the bowel here is smaller, the fecal content is formed, and the movements in this portion of the gut are of the large, forceful, propulsive type (Larson and Barger). Obstruction is more likely to occur, too, especially where flexures are present such as at the splenic and rectosigmoid regions. This was borne out in the present series of cases where tumors in the two named regions practically uniformly resulted in obstructive symptoms. The opposite conditions all hold true for growths in the proximal half of the colon, because here the lumen of the bowel is wide and capacious, the contents are always liquid in nature, and the movements in this segment of the gut are small, rapid churning ones intended to aid in absorption. Furthermore, growths in this area usually are large, flat, and ulcerating, additional factors favoring absorption of toxic products. Therefore in this region the early symptoms, and sometimes the only ones, are

those of disturbance of physiologic equilibrium such as anemia, toxemia, weakness, and loss of weight. Many of these individuals complain of symptoms suggesting recurrent attacks of appendicitis, cholecystic disease or peptic ulcer. Additional reason for the difference in the two locations may be understood from a study of the embryology of this region. The right half of the colon is developed from the mid-gut along with the small bowel, while the left is a reservoir or storage segment and is derived from the hind gut.

Tumors in the transverse colon rarely produce the severe anemia seen with those of the proximal large intestine, but they likewise uncommonly give rise to obstructive phenomena. Although the tumors here are usually of the "napkin ring" type, yet, since the content is fluid, obstruction does not supervene until almost complete closure develops. Symptoms are particularly liable to be referable to disease in the stomach, and to a less extent the gallbladder, because direct extension to the glands of the stomach and omentum through the mesocolon is usually early. Metastasis to the liver is likewise early.

Lesions in the rectosigmoid early give rise to obstruction, a fact which can readily be appreciated from a consideration of its anatomical structure. This region is the point at which the sigmoid joins the rectum, not in a straight line, but at an angle. When the longitudinal muscular bands on the peritoneal surface of the sigmoid spread out to grasp and completely surround the entire rectum, there is produced a fixed point with a definite narrowing, and since there is practically no mesentery in this area, a virtual sphincter is said to exist. However, no sphincteric muscle has actually ever been demonstrated at this point although it is true that there is a mechanism here similar to the pyloric sphincter, tending to retard the fecal current and acting in much the same manner as the pylorus. Obstruction takes place early, and usually the patient is aware of his disease at an earlier date than with tumors located elsewhere in the colon. As regards metastases, the lymphatic drainage of this particular area, (demonstrated so beautifully by Miles) and the extent of operation necessary for a lesion situated here, emphasizes again the need for accurate localization of the tumor. This brings out again the importance of carrying out digital and proctoscopic examination on individuals with com-

plaints suggesting disease of the colon. In this particular series of cases, 107 of the 210 malignant tumors occurred in the anus, rectum, and rectosigmoid, regions which are readily accessible to the proctoscope, and an additional thirty-three were located in the sigmoid, a place which frequently can be visualized, so that well over half of all these tumors of the colon could be diagnosed by inspection alone. This is an important fact when one considers the high incidence of cases which come undiagnosed to operation or necropsy, and likewise that large group of patients with carcinoma of the rectum who are operated upon for hemorrhoids. The significance of obstruction in relation to treatment of lesions of the colon demands special consideration. Briefly it may be stated that preliminary measures for the surgical management of left colon lesions are directed toward a correction of obstruction, dehydration, debilitation and starvation, while with those of the right colon, treatment is concerned mainly with anemia and toxemia.

3. *Size and direction of growth of lesion.*—While the size of a lesion frequently has a direct relation to its resectability, yet the incidence or possibility of metastasis is not in ratio to this characteristic. In other words some of the largest lesions have no extension and conversely a small tumor may have extensive and widespread metastases. The direction of growth as shown by Rankin and Olson has considerable bearing on the ultimate prognosis. Treatment of tumors which grow into the lumen of the gut is attended with better results than in those which extend toward the serosa. These authors found that the former group are more likely to be of the papillary type and of a lower degree of malignancy while the latter are closer to the lymphatic glands, are of a higher grade of malignancy, and metastasize at an earlier date.

4. *Amount of fixation of tumor.* Fixation is brought about more frequently by extension of inflammatory processes than by an actual invasion of the surrounding structures by the neoplastic tissue; therefore, even in the presence of extensive fixation it is often possible to render an otherwise inoperable growth an operable one by side-tracking the fecal current. With ileostomy, cecostomy, or colostomy, preliminary to a resection of the growth, irrigation of the diseased area is made possible and is of considerable aid in reducing inflammatory changes. The advan-

stages of multiple stage operation in these cases are obvious, since inflammatory changes are reduced, obstruction relieved, and the patient develops a resistance to the infection, all factors which reduce the operative risk. It is frequently possible in patients who are good surgical risks to resect portions of the bladder, and all or part of the prostate, seminal vesicles, uterus and vagina, along with the neoplasm. It is furthermore highly desirable that infection around the growth be reduced to a minimum because permeability of the colon is very high when there is a combination of even a small degree of obstruction with ulceration, tending to favor the spread of peritonitis. Leakage of suture lines and pulling apart of anastomoses are factors that probably are less responsible for peritonitis than manipulation of the growth. The latter often results in extravasation of organisms into surrounding tissues.

The cause of death in this series of 210 cases is of interest.

TABLE I

Cause of Death	With Metastases	Without Metastases
Surgical: peritonitis, ileus, shock, hemorrhage, etc.....	44	42
Exhaustion	48	2
Spontaneous perforation.....	11	11
Obstruction	8	10
Cardio-renal-vascular	14	6
Pulmonary disease.....	7	0
Secondary anemia.....	0	2
Death by accident.....	1	4
Totals	133	77

From this table it will be seen that where death followed a surgical procedure the percentage was considerably higher in cases without metastases, suggesting that the surgeon attempted a more extensive operation. Where metastases were present, the resistance of the patient was lower because of the deleterious toxic effects of the tumor and even the smallest operations were accompanied with a greater chance of peritonitis, ileus, shock and so forth. Patients with metastases less often came to operation than those without metastases, so that this would tend to increase the incidence of deaths from operation in the latter group. Obstruction as a primary cause of death took place more frequently in cases in which there were no metastases, fre-

quently a direct sequel to operative maneuvers. When the latter were excluded, obstruction occurred with practically the same incidence regardless of the presence or absence of metastases. Cardio-renal-vascular diseases were present in very nearly the same percentages in both groups of cases, while pulmonary disorders such as broncho-pneumonia and tuberculosis were much more frequent in the long drawn out cases, for death took place so slowly in the presence of metastases that lowering of resistance was a sizable factor in inducing complicating diseases.

Summary

1. The factor of age in determining the prognosis as well as the incidence of metastasis in a large group of cases of carcinoma of the colon is an important one, and should be considered in the same light with grading of the lesion, size of the tumor, and direction of growth of the neoplasm.

2. In a group of 210 cases of malignant lesions of the large intestine coming to necropsy, there were 77 (37 per cent) in which no metastases could be demonstrated. Many of these individuals died without treatment directed toward cure of the disease. Those who came to autopsy before metastases occurred were preponderantly in the later age groups, and conversely in the younger patients dying of this disease there was a relatively greater incidence of metastases. In other words, the older the patient who develops carcinoma of the colon, the greater are his chances for having a locally operable lesion.

3. In 113 of the 210 cases there were either no metastases at all or there were present only a few small regional glands which seemed reasonably amenable to resection; thus, well over half of the cases were locally operable. This gives further evidence as to the generally slow growing nature of tumors in the large bowel, especially in older individuals.

4. There was no significant difference between the occurrence of malignant lesions in the right or left colon in respect to the age of the patient. Furthermore, there was no difference in the incidence of metastases as compared to the location of the primary lesion in the right or left colon.

5. Besides the factor of age in determining

the prognosis and management of these cases one must take into consideration other pathologic factors such as accurate localization of the tumor, degree of obstruction present, size and direction of growth of the lesion, amount of fixation of the tumor, and grading of the degree of malignancy of the neoplasm.

6. These growths were located with the greatest frequency at the two extremities of the colon, and more than half of the total number could have been visualized through the proctoscope or sigmoidoscope since they were in the rectum, rectosigmoid or lower sigmoid. This is a significant fact when one takes into consideration the large number of these cases which come undiagnosed to operation or necropsy.
1737 Medical Arts Bldg.

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THE PREOPERATIVE, OPERATIVE AND POSTOPERATIVE TECHNIC OF PROSTATIC RESECTION WITH THE DIRECT VISION COLD KNIFE INSTRUMENT*

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ATTEMPTS to relieve prostatic obstruction or the relief of obstructions that prevent the normal outflow of urine from the urinary bladder by means of instruments passed through the urethra, are not new or of recent origin.

Before the Christian era, there is evidence that instruments were made to pass through the urethra for the purpose of pushing aside, cutting or breaking up the obstructing prostate, although it was not until 1510 that we find a description of a definite operative procedure per urethram for the relief of prostatic obstruction. The instruments used and the results obtained during these early years were not successful because the anatomy, physiology and pathology of prostatic and other obstructions were not well understood.

The advent of electricity, which made illumination and visual examination of hollow organs possible, changed many of the early ideas which our predecessors had concerning prostatic obstruction. Recent additions to our armamentarium are high frequency and other electric currents which permit cutting in a water medium under the di-

rection of the eye. These have again revived the attack on prostatic obstruction through the urethra, so that many instruments with the new ideas incorporated in them are now made for this purpose.

The modern instruments may be divided into three types:

1. Dr. John Caulk has perfected an instrument which incorporated at first direct, and later on indirect, vision with telescopes. He uses a circular knife made of iridio-platinum which cuts under water and is activated by a *low voltage cautery current*. This instrument contains the knife of the direct vision type and makes use of a cautery current, but not the high voltage current used in the instruments of group 3.

2. The direct vision instrument made by Braasch and Bumpus has no telescope or prisms. It is a straight, hollow tube with its end upturned as an ordinary cystoscope. Vision is obtained directly through an eyepiece of plain glass which fits into the outer end of the instrument. Lighting is produced by a small bulb inside the beak. Within the sheath of this resectoscope a circular knife and two electrodes may be introduced and

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withdrawn at will. The knife operates cold and is not connected with, activated or heated by an electric current.

3. Instruments that remove portions of the prostate by means of a wire loop or other shaped electrodes that are activated by a high frequency electric current. Indirect visualization is obtained through a telescope and by means of prisms. The angle of visual observation may be oblique, for-oblique or right angle. These resectoscopes have a shape similar to the usual cystoscope or they may be a straight tube without a beak and are made of insulating material.

Because I have never been satisfied that the electric high frequency cutting current is as simple and localized in its effect on tissue as its proponents claim, I have used routinely the direct vision cold-knife cutting instrument as designed by Braasch and Bumpus.

A New Principle in Modern Surgery of the Prostate

The success of cutting electric currents in water and instruments for making use of them, and Dr. John Caulk's persistence in the use of his cautery punch for removing large sections, has introduced a new principle in modern surgery of the prostate gland. This experience has taught urologists that only that portion of the prostate that protrudes into the urethra and bladder neck and that interferes with the normal act of urination need be removed.

The greatest new field of usefulness that the modern instruments and electric currents open is what may be called the "Prophylaxis of Prostatic Hypertrophy." By this I mean the removal of the beginning enlargements of the prostate before the urethra and neck of the bladder become distorted. It is very probable that an early operation may prevent further hypertrophy and the distressing complications which may accompany continuing prostatic enlargement. Another group of patients within the prostate age with bladder neck contractions and prostatic bars, who were formerly not subjected to surgical treatment because no true prostatic enlargement was found, may now be resected. Complete relief from urinary symptoms may be expected following resection of this group.

I have found that these new methods, when used judiciously, may make it possible to remove sections of the prostate in patients who would

be denied surgical treatment if it were necessary for them to submit to a suprapubic or perineal enucleation. They are always poor surgical risks and have a continuously low phenolsulphone-phthalein and urinary output, a damaged heart or some other debilitating condition. They should always have a suprapubic cystotomy. I am careful not to submit them to a prolonged anesthetic or too much manipulation at one time. Following suprapubic drainage one is not forced to remove enough prostate at one sitting to relieve these patients completely; the anesthetic and the manipulation may be restricted to not longer than three-fourths of an hour. If more of the prostate must be removed a second and sometimes a third resection may be done.

I have found that cancer of the prostate is treated better by resection than any method we now have of controlling this very disagreeable condition. This method of operation will restore the patient's normal urinary facility, and in doubtful cases may obtain a satisfactory specimen for microscopic study. Following resection it is possible to use radium, x-ray, or whatever therapy seems best. If the resection has to be repeated it may not be a serious procedure for the patient.

Preoperative Preparation of Patients

Mortality may follow prostatic resection as it may follow prostatectomy, so that before resection I have continued the careful preoperative preparation practiced by all urologists who contemplate prostatectomy. Infection is still the complication that requires most attention, since it produces the greatest morbidity and mortality. The relief of residual urine is important, but when this is accomplished, without introducing infection into the blood stream via the urethra, it is not troublesome. When there is much urinary infection, with or without retention and when there is more than a little damage to the kidneys or the heart, a preliminary suprapubic cystotomy should be made. This suprapubic drain must remain until infection has been controlled, until kidney function has stabilized, and until the strength of the heart muscle has been evaluated. The most important of these conditions that must be controlled is urinary infection, particularly when the patient has a coexisting pyelonephritis and cystitis. Repeated estimation of the number of pus cells in the urine is as impor-

tant a factor as the phenolsulphonephthalein output and blood chemistry values in determining when a patient is a safe risk for operation. When infection has reached the kidneys and

for resection who have an undiscovered prostatitis. If resections are done on this group, prostatic abscess is frequent and these patients continue to have a cloudy urine and practically



Fig. 1. Front view of Urological Treatment Cart.
a. 1,000 c.c. enamel graduates for making solutions.
b. Sterile glass syringes.
c. Sterile instrument packages.
d. Sterile gloves and dressings.

when the pus cells do not decrease promptly following suprapubic drainage and the use of the usual urinary antiseptics, we use a ketogenic diet, together with urotropin and some acid salt by mouth. If these are given in sufficient amounts, the physical properties and the acidity of the urine, which should be a P_H of 5.2 or less, makes the urine bacteriostatic and sometimes bactericidal.

Patients with little residual urine, which is not infected, and blood chemistry and phenolsulphonephthalein output within the range of normal, may not require more than a few days preoperative preparation. Many urologists who contemplate prostatic resection require little, if any, preoperative treatment of the patient. Marked temperature rises and chills following resection occurred frequently with patients who did not have preoperative care and careful attention to the prevention of infection.

Prostatitis should be treated thoroughly before resection is done. Many patients are referred



Fig. 2. Top view of Urological Treatment Cart.

- a. Container for various sizes and shapes of catheters which have been sterilized ready for use.
- b. Instruments in sterile instrument package spread ready for use.
- c. Glass flask containing sterile water for making solutions.
- d. Basins which receive returning irrigating solution from the bladder.
- e. Disposal basin for soiled instruments and dressings.
- f. Sterile container for rubber bulbs which fit glass irrigating syringes.

no relief from their urinary symptoms for many weeks after resection.

Partial Vasectomy

Epididymitis continues to be a very troublesome complication with resection so that I advise partial vasectomy before preoperative treatment is started.

Cystoscopy and Endoscopy

A careful cystoscopic and endoscopic examination of the neck of the bladder and the prostatic urethra is imperative. The surgeon must first determine that operative treatment is necessary and then decide whether resection or prostatectomy is the best method.

The preoperative technic of any method of prostatic resection must include the selection of patients best fitted for this type of surgical treatment. Some urologists, since the advent of the

resectoscope, find surgical enucleation unnecessary. I have found this attitude to be wrong. We cannot fit the patient or the condition which he has to any operative procedure which we may feel like using. We must fit the procedure to the patient and the condition which he has. A very large, intravesical, easily-bleeding gland may require digital enucleation. Suprapubic prostatectomy by competent surgeons who know and appreciate the necessity and importance of careful preoperative treatment will not take longer and will involve less risk than two or more resection bouts. However, with the late improvements in technic, it is possible to resect the majority of hypertrophied prostates.

Anesthesia

The technic of prostatic resection much include the careful selection of an anesthetic. Spinal or caudal anesthesia may permit reflux of infected urine from the bladder to the kidney pelvis in normal individuals, because the uretero-vesical valve may be temporarily incompetent. If spinal or caudal anesthesia are used routinely, the average surgeon may forget the possibility of bladder overdistention. Recently I saw a patient who had a ruptured bladder, the result of rough manipulation, accompanying overdistension during spinal anesthesia. With general anesthesia, reflexes are retained so that the patient will force the dilating fluid through the urethra during overdistention. I have found nitrous oxide, plus ether when necessary, to be the safest and surest anesthetic when resection is to be done. The selection of the best and safest anesthetic for each patient must be made after all his physical conditions are evaluated and the operative and post-operative plans have been decided.

Technic of Resection

Before the actual resection is begun, some arrangement should be made for an unlimited and uninterrupted supply of an antiseptic solution which may be used to distend the bladder and to irrigate the urethra. This should be non-irritating, but antiseptic enough to control infection if it does not disinfect the bladder and the operated area. For this purpose I have used a 1 to 10,000 solution of oxycyanide of mercury. I had an arrangement of the water pipes built into my operating room, so that an irrigator may be con-

tinuously filled with this solution without disturbing the operation or the surgeon.

After the resectoscope has been passed through the urethra, a thorough inspection of the bladder,

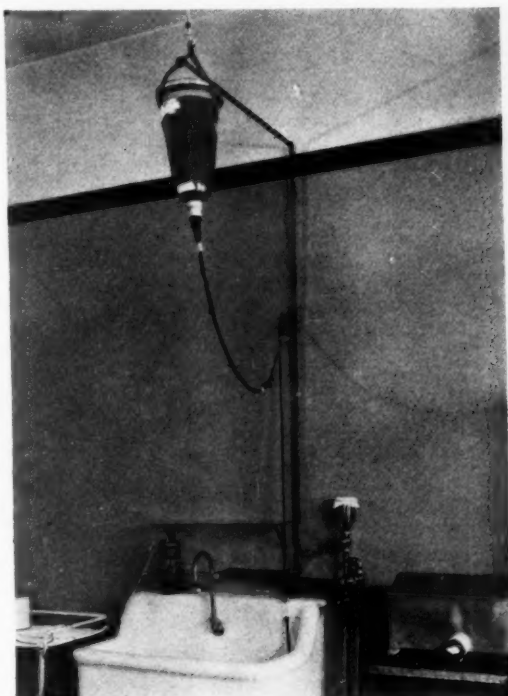


Fig. 3. A special arrangement of the water pipes in the Urological Operating Room which permits constant filling of the irrigator. A by-pass with filling funnel permits the easy introduction of some concentrated antiseptic solution which is diluted as the irrigator is filled.

prostate and prostatic urethra must be made, so that the surgeon may know how much the lobes of the prostate are enlarged, how much tissue should be removed, and where the resection should be started. When the site for beginning the operation has been selected, the beak of the direct vision instrument is depressed so that a portion of the prostate protrudes through the fenestrum. The preresection coagulating apparatus, consisting of several needles held in an insulated obturator (see cut) is passed through the sheath of the resectoscope so that the needles protrude into the portion of the prostate which is caught in the fenestrum. The coagulating current is then turned on for a period of about five seconds. Without moving the resectoscope sheath, the coagulating electrode is removed, the circular knife is introduced and with a circular

motion the portion previously coagulated is cut away. If the knife is sharp and if it is rotated as it is pushed through the tissue, a clean cut results and a large core of tissue is removed. The



Fig. 4. Posterior view of Urological Treatment Cart showing stock solutions which may be used for irrigation.

bit of tissue is washed out immediately after the circular knife has been withdrawn or it may remain within the lumen of the knife.

After one or more sections of prostatic tissue are removed in this manner, the operated area is inspected so that if bleeding vessels are seen, the guide carrying the single cold wire coagulating electrode is introduced into the sheath of the resectoscope. The end of the electrode is touched directly to the vessel opening and a moderate amount of coagulation produced until the bleeding is completely stopped.

The median portion of the prostate should be attacked first, because the greatest amount of relief occurs when tissue from this area is removed.

The surgeon should devote more attention to the removal of portions of the prostate along the floor and inferior lateral walls of the bladder and urethra than he should to the large bilateral lobes which may protrude superiorly. One is much surprised, however, after doing a complete "funneling" to find that the patient still has retention. In a few instances I found that this was produced by overhanging flaps of the superior

portion of the gland. Subsequently these flaps had to be resected.

When it becomes necessary to resect the bilateral lobes, this should be started from the bladder part of the protruding prostate and should be continued until one has a through and through passage from the verumontanum to the bladder without obstructions from lobes of the prostate. If the first cores of tissue are not removed from that portion of the bilateral lobes which protrude into the bladder or from the bladder end of the urethral enlargements, resection of this portion of the prostate may be troublesome. It is very difficult to engage portions of the lateral lobes in the fenestrum of the direct vision instrument if the bladder portions are not resected first. The direct vision instrument must be manipulated laterally to engage portions of the lateral lobes. This manipulation may be difficult for the beginner and requires much experience and persistence before the urologist can master this part of the resection technic. The resection should never be continued forward far enough to involve the verumontanum.

Following the removal of sufficient tissue the entire operated area is thoroughly inspected at least three times with the coagulating electrode in place ready for use. Every spurting vessel is coagulated so that no bleeding occurs. Too much coagulation should be avoided as these areas harbor infection. After the resection is completed, the irrigating fluid from the bladder should contain no more blood than to tinge it a slight pink, coming from the raw areas which have just been cut and from slight oozing.

Postoperative Care

I emphasize the care with which bleeding should be controlled because this is one of the most discouraging postoperative complications that may occur. After inspection shows that the bleeding has been thoroughly controlled, and that no clots can be found in the bladder, a catheter is introduced and continuous irrigation started. Although we do not use this method routinely, in a few instances we have been able to control the bleeding sufficiently so that no permanent catheter was put through the urethra following the completion of the resection. This drainage catheter need not be a large one. We frequently use catheters of 18 to 20 French and never larger than 24

to 26 French. If the bleeding has been thoroughly controlled, it is unnecessary to introduce a larger one. We insist that catheters have multiple eyes, one on the end and several on the sides, as these permit easy irrigation and the sucking out of clots if bleeding occurs.

If the first inspection after the patient returns to bed shows that no bleeding has occurred, irrigations are done every half hour. Syringes of one ounce capacity are used. These must have a catheter point and well fitting plungers so that suction may be made. A cold antiseptic solution, of either oxycyanide 1 to 10,000 or metaphen 1 to 15,000 dilution, is used for irrigation. If the catheter becomes obstructed, the nurse introduces one-half to one ounce of the cold antiseptic solution and then slowly removes it by suction. This will indicate whether the catheter is open or not, and will remove any clots that may be in the eye or the shaft. When clots are found, irrigation is done every two or three minutes, a small amount of antiseptic solution being gently forced into the bladder and allowed to run back through the catheter. If the solution does not come back promptly, because of clots or bleeding, the irrigation is done continuously. After three hours if bleeding is only slight, continuous irrigation is stopped. At the end of twenty-four hours irrigations should be done twice a day only. At the end of forty-eight hours, the catheter is removed, when I am very careful not only to irrigate the bladder, but the urethra as well. This may be done as the catheter is being removed. Irrigation of the urethra may prevent hematogenous infection, which occurs following the urethral trauma incident to the removal of the catheter. The consequent fever with chills and the discouraging time that both the patient and the surgeon may experience, may be obviated if traumatic lesions of the urethra and subsequent bacteremia may be prevented. Following the removal of the catheter, the bladder and urethra are washed every day, using gentle pressure with a syringe and without a catheter. The patient is given Sitz baths and the routine method of controlling urinary infection as described under preoperative measures. After the patient has been in the hospital one week and is able to empty his bladder in a normal manner, he is allowed to return home, but is instructed to report every day during the next week when his bladder and urethra are irrigated.

If no residual urine is present this should be done without a catheter.

The patient's future convalescence is planned according to the findings during the second week

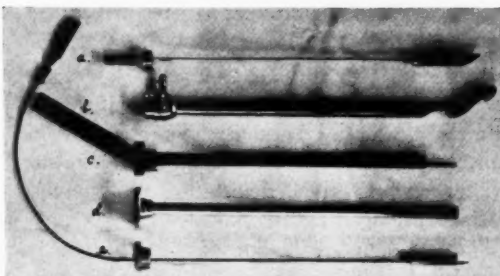


Fig. 5. The direct vision instrument designed by Braasch and Bumpus from above downward:

- a. The obturator.
- b. The sheath of the instrument with the obturator removed so that the window into which the portions of the prostate protrude may be seen.
- c. Pre-resection electrode.
- d. Circular knife for cutting which is not activated by an electrical current and is used cold.
- e. Post-resection electrode used for coagulating small blood vessels.

of his treatment. If there is pus in the urine or dribbling, or if residual urine is still present, daily irrigations of the bladder and urethra are continued.

This postoperative care of the patient who has had a prostatic resection is more exacting, requires more time and more trained assistants and nurses than the treatment necessary following suprapubic prostatectomy. Few hospitals have ready at hand, on every floor or in every ward, all the necessary equipment that may be required to give prompt treatment. This frequent lack of ready equipment caused me to build and equip a cart which is a complete urological treatment room on wheels which may be used at any time and at any place. This completely equipped cart, plus the assistance of a few well-trained assistants or nurses, has reduced our postoperative complications to a minimum and has reduced the time necessary for the patient's daily treatment.

The average amount of tissue that we have removed at one operation is 10 to 12 grams. In a few instances we have removed as much as 40 grams. The cores of tissue removed are always inspected microscopically.

The technic of prostatic resection will vary somewhat, depending upon the instrument used and the surgeon who uses it. No physician or

surgeon should attempt to become a resectionist subsequent to the purchase of one or more of the instruments and appliances now on sale. He must have had special training, so that he possesses:

1. An intimate knowledge of all available types of instruments for resection.
2. A thorough training in the use of one or more of these instruments and sufficient general surgical experience so that enucleation of the prostate, suprapubic cystotomy or any other surgical operation associated with this condition may be done promptly when indicated.
3. A clear understanding of the principles involved in prostatic resection.
4. An understanding of where in the urethra or bladder-neck prostatic resection should begin and how far it should be continued, and why.
5. An appreciation that prostatic resection is a major surgical job requiring more exacting pre-operative, operative and post-operative technique than suprapubic surgical enucleation.

I have adopted a few unchangeable rules concerning the technic of prostatic resection, which are:

1. The careful selection of patients. All prostatic obstructions may not need operation and many may not be resectable.
2. Preoperative treatment which must include suprapubic cystotomy in many cases and partial vasectomy in the large majority.
3. The selection of an anesthetic to fit the operation and the physical condition of the patient.
4. The association of thoroughly trained assistants and special instruments and appliances that are always available, so that prompt post-operative care may be had at any time.

Conclusion

My experience teaches me that, even when a careful technic is followed and when cases are selected, this method of resection offers the prostatic no better ultimate prognosis than he had with prostatectomy done by competent surgeons.

However, many more patients may be safely operated upon and their time in the hospital and convalescence following operation may be greatly reduced.

TRANSURETHRAL PROSTATIC RESECTION*

A Review of 721 Cases in Which the Operation Was Performed During 1932 and 1933

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TRANSURETHRAL resection of tissue causing obstruction to urination has proved a blessing to many men formerly denied restoration of vesical function. In recent years this operation has been applied in many cases in which patients for ten years or more had been using a catheter or depending on a suprapubic stoma to drain their urine. In fact, early in the period of the recently revived interest in transurethral surgery, its merit was determined by taxing it with patients who were not fit subjects for prostatectomy. Surviving such a severe test, with a demonstrated mortality rate much less than that following total enucleation of the pros-

tate gland by any method, the procedure has enjoyed a healthy growth and has been extended to include good as well as poor risks. In addition to the fact that it has been applied in practically all cases in which patients formerly would have been subjected to prostatectomy, another group of patients, namely, those with beginning, although definite, obstructive symptoms and a small amount of residual urine, have readily accepted this form of operation, and they have been spared the many months or years of suffering which they formerly would have endured rather than face the risk of relief by prostatectomy. A third group of patients to whom the transurethral operation has universally been acceptable consists of physicians afflicted

*From the Section of Urology, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota State Medical Society, Duluth, Minnesota, July 16, 17 and 18, 1934.

with prostatic obstruction. As a medical endorsement of the method, we might add that for several years all physicians who were to be operated on for obstructive lesions of the prostate gland at The Mayo Clinic have requested transurethral surgery for the relief of their symptoms.

In the years of 1932 and 1933, 721 patients underwent transurethral resection and forty-six, prostatectomy. The large majority of the patients who underwent prostatectomy were operated on early in 1932, since, in 1933, only seven patients were subjected to total enucleation of the gland. It is the present feeling that only those patients require prostatectomy who have enlargement of the prostate gland or who have deformity of the urethra sufficient to prevent passage of a resectoscope; these are indeed rare cases, especially when the attempt at instrumentation is made with the relaxation of the perineal muscles and prostatic urethra that accompanies anesthesia.

This selection of cases for prostatectomy, namely, those in which a resectoscope cannot be passed, seems to be the only restriction in the application of transurethral resection by a surgeon well-versed in the method. In his early experience, however, a surgeon will do well to choose his cases for resection and restrict his efforts with the resectoscope to patients with moderate enlargement of the prostate gland, relying principally on prostatectomy until he is thoroughly familiar with the pathologic anatomy of the prostatic urethra as viewed through the endoscope. The physician not skilled with a cystoscope of a type that accurately reveals the contour of the urethra will encounter nothing but grief and tragedy when he tries to better the results he could obtain through prostatectomy by turning to transurethral surgery. This has fully been demonstrated in the past few years.

These 721 patients who submitted themselves to resection during 1932 and 1933 complained of the usual symptoms of obstruction and of dysuria; 23 per cent had suffered less than a year, 33 per cent for periods varying from one to three years, and 44 per cent for from three to twenty years or more. Only 3.6 per cent were less than fifty years of age; 21.2 per cent of the patients were from fifty to fifty-nine years of age, 64 per cent were from sixty-one to seventy-four years of age, and 11.2 per cent were from seventy-five to ninety-five years of age. Thus it

can be seen that this was a representative group of patients.

Thorough physical examination, in addition to the usual urologic study, is essential. Roentgenograms of the thorax and of the abdomen, and of the various intra-abdominal viscera in some cases, as well as the usual laboratory tests, are indicated if one wishes to anticipate complications before they arise or to complete the medical or surgical treatment definitely required in any given case. Diseases associated with prostatic obstruction in this group of 721 patients were divided into three classes: cardiovascular disease, carcinoma and miscellaneous diseases.

The number of cases in which the various cardiovascular diseases occurred were as follows: angina pectoris, twelve; bundle-branch block, complete, three; bundle-branch block, incomplete, ten; coronary sclerosis, twenty-one; aortic sclerosis, forty-seven, myocarditis with decompensation, twelve; valvular stenosis, four; arteriosclerosis, grades 2, 3, and 4, 120; residual hemiplegia, two; and hypertension with blood pressure more than 150 systolic and 90 diastolic, 216.

The situation of the carcinoma, and the number of cases in which the carcinoma was in each situation were as follows: rectosigmoid or colon, six; stomach, four; bladder, four; lip and face, three; and penis, thyroid gland, and larynx, one case each.

Miscellaneous diseases, and the number of cases of each were as follows: diabetes mellitus, thirty; syphilis, eighteen; duodenal ulcer, thirteen; disease of liver and gallbladder, eleven; goiter, seven; Parkinson's syndrome, four; pituitary tumor, one; gout, five; and severe pulmonary disease, sixteen.

Next in importance is thorough study of renal function. Tests of retention of nitrogen probably are most valuable; excretion tests, such as the phenolsulphonephthalein test, are, however, useful in estimating the degree of existing hydro-nephrosis or of hydronephrosis. Likewise, in selected cases, an intravenous urogram serves as an excellent excretory test of function and, in addition, delineates any deformity that exists in the upper portion of the urinary tract. In fifteen cases in this group, one kidney was found to be completely functionless at the conclusion of the preoperative period of preparation. In only one case was nephrectomy necessary during con-

valescence from prostatic resection. Various other tests of renal function, such as urea or sulphate clearance, retention of creatinine, or determination of serum sulphates, were made in selected cases. The amounts of urea retained in the blood at the time of admission and twenty-four hours before operation are given in Table I.

TABLE I. UREA RETAINED IN BLOOD

On admission, mg. per 100 c.c. of blood	Cases, per cent	Day before oper- ation, mg. per 100 c.c. of blood	Cases, per cent
Up to 40	71	Up to 40	85
41 to 100	24	41 to 70	14
101 to 200	4	71 to 100	1
200 or more	1	Over 101	

A variety of opinions has been expressed as to the value of an inlying catheter as a means of draining the bladder prior to operation on the prostate gland. Some have said that it is always indicated because it reduces infection in cases in which cystitis is present, and leads to cystitis and consequently to vaccination against subsequent severe infection in cases in which urine is sterile on admission. These arguments seem inconsistent. Others have stated that the amount of residual urine should be the determining factor in deciding whether such a measure should be instituted; this also seems illogical. It is our belief that the degree of impairment of renal function is a factor of primary importance. The amount of residual urine, the degree of pyuria, or the size of the prostate gland all are factors of secondary importance. One should not, of course, operate on a patient with a high fever, or on one whose extremely purulent urine drains from a vesical diverticulum through a narrow diverticular orifice. We are firmly convinced, however, that a prolonged period of drainage by means of a catheter, in the hope that pyuria will be greatly diminished or that a large gland will shrink to a small fraction of its former size, will lead to more disaster than complete avoidance of such preoperative treatment. Of the 721 patients, 28.1 per cent were unable to void on admission to the clinic, and practically all of this number had been using a catheter, although in some instances suprapubic drainage had been established elsewhere; 47.1 per cent

were able to void but had residual urine varying from 60 c.c. to 4,000 c.c., and symptoms were deemed sufficient for operation, especially in view of a history of a greater retention, among 23.9 per cent of the patients who, on examination, had 60 c.c. or less of residual urine after voiding.

The bladders of 399 patients (55 per cent) were not drained before operation, with the exception of a single catheterization to estimate the amount of residual urine, transurethral resection being performed immediately after completion of examination. Drainage for a period of from several days to several months, before transurethral operation, was employed in other cases, and the following methods were used: intermittent drainage by catheter in twenty-six cases (4 per cent); permanent drainage by urethral catheter in 208 cases (29 per cent), and cystostomy performed at the clinic or elsewhere in eighty-eight cases (12 per cent). Cystostomy, as a preliminary method of drainage, was established in conjunction with a diverticulectomy, resection of vesical tumors or with removal of large vesical calculi in many of the eighty-eight cases so listed.

Anesthesia induced by injecting procaine into the spinal fluid has been found superior to all other forms of anesthesia and it was used in 89 per cent of the cases in this series. One should never use more than 100 mg. of the drug, and often as little as 50 mg. will suffice, particularly for men who are more than seventy-five years of age because they seem to metabolize procaine very slowly. In the remaining 11 per cent of cases general anesthesia was employed. One might question the duration of spinal anesthesia produced by procaine, particularly in the smaller doses. We found, however, that supplemental anesthesia rarely was necessary, since 80 per cent of the operations were completed in less than an hour.

The various types of prostatic obstruction, and the number of cases of each type were as follows: contracted vesical neck, sixty-three (9 per cent); hypertrophy of median lobe (entirely or predominantly), 179 (25 per cent); hypertrophy of lateral lobes (entirely or predominantly), 163 (23 per cent); tri-lobar hypertrophy, 214 (30 per cent), and carcinoma, ninety-five (13 per cent).

Thorough study of the vesical neck with a

retrograde-lens cystoscope is desirable in mapping out the course of operation. With such an instrument the portion of the gland which protrudes into the bladder is readily visualized, and nodules, which often herniate through the internal sphincter in very bizzare fashion, are revealed. Tags and portions of tissue are formed which, if not removed, are potential sources of annoyance postoperatively since they cause a valve-like flap at the internal urethral orifice which seriously impedes urination. Complete removal of all tissue projecting into the bladder, and of any nodules which fold into the vesical neck, is most essential. A free channel through the prostatic urethra is desirable, although this is not so important as is a wide-open funnel at the internal urethral orifice. Transurethral prostatic resection is not a "channeling" operation. It is not sufficient to cut a groove through a large, median lobe. Such operations result in convalescence prolonged by repeated bleeding from sloughing areas in the portion of the prostate gland that is caught in the partially opened vesical neck. Tenesmus, dysuria, fever and chills, and early recurrence of obstruction are the inevitable consequences of such incomplete operations, bringing discredit to a procedure which, if skillfully done, cannot be equalled in the quick, certain, complete relief it affords the patient.

The removal of tissue must be kept well within the external sphincter; it is in only an exceptional case that one should resect even within several centimeters of this muscle. Hence, the percentage of cases of incontinence should be very low, if indeed this condition need occur at all. Sufficient tissue should be excised to enlarge the vesical neck considerably. At times removal of the entire subcervical lobe, of a huge, intravesical, projecting, commissural portion, or of large obstructing portions of large lateral lobes will tax the patience and ingenuity of the surgeon.

In 9.8 per cent of these 721 cases it was necessary to remove more than 25 gm. of tissue to relieve the obstruction; in 35.5 per cent between 10 and 25 gm. of tissue were removed, in 28.7 per cent between 5 and 10 gm. of tissue were removed, and, in 26 per cent, the removal of less than 5 gm. of tissue sufficed to eliminate residual urine. In one case 116 gm. of tissue were removed (Fig. 1). There is little question

that such thorough removal of tissue will obviate future obstruction.

Postoperative care should include measures to avoid prolonged hemorrhage. It has not been



Fig. 1. Tissue weighing 116 gm. removed from a prostate gland. The baseball is 9 inches (22.5 cm.) in circumference.

found necessary at the clinic to use prostatic bags, and frequent lavage with boric acid solution through an inlying catheter has been depended on to minimize formation of clots. Drainage by catheter of forty-eight hours' duration usually is sufficient. Following removal of the catheter, one should watch for evidence of continued urinary difficulty and catheterize the patient again in six hours or less to determine whether or not he is voiding completely. In 13.6 per cent of cases, secondary resections were found necessary to enable the patient to void a large, unobstructed stream of urine. Many of these patients might have been persuaded to be content with a small intermittent stream, and thus have avoided this repetition of the operation, although the functional result would have been inferior and the chance of early recurrence possibly greater. The secondary operation as a rule results in even less discomfort and reaction than the primary one, and the possibility of delayed hemorrhage, pyelonephritis, and of fever of urethral origin is minimized by not forcing the patient to get along with a poorly functioning vesical neck partly obstructed by edematous, adenomatous tissue. Some investigators claim such tissue eventually will be absorbed or shrink if left alone. If the patient is completely emptying his bladder, determined by catheterization on successive days, he will not require further postoperative treatment other than continued observation to obviate the danger of delayed bleeding. In the average case healing will be complete in approximately three weeks. If severe hemorrhage should supervene during this period,

aspiration of the clots through a cystoscope and electrocoagulation of bleeding points is always possible. Cystostomy to control such hemorrhage was not required in any case in this series.

The period of hospitalization is given in table 2. During this time, with the exception of the day of operation, most of the patients are ambulatory.

TABLE II. POSTOPERATIVE DAYS IN HOSPITAL

Days in hospital	Cases	Per cent
1 to 7.....	357	49
8 to 14.....	229	32
15 to 21.....	78	11
22 to 28.....	35	5
29 or more.....	22	3
Total.....	721	100

The mortality rate in this series of 721 cases was approximately 0.7 per cent; five patients, between sixty-six and eighty-five years of age, died from fourteen to thirty-two days postoperatively. Two of these deaths were from bronchopneumonia, one from pyelonephritis, one from septicemia, and one from pulmonary embolism. Since the time the last patient died following operation, a consecutive series of more than 350 patients has been operated on without a death.

Up to January 1, 1934, twenty-six patients had returned for prostatic resection following resection or punch operation done during the interval from January 1, 1913, to January 1, 1933. Resection was performed for 655 patients in this period. Eight of these twenty-six patients had a malignant condition in the gland at the time of primary operation; recurrence, therefore, might well be expected. Four of the remaining eighteen patients suffered initially from a contracted vesical neck, whereas six had only a small median bar. This leaves only eight cases in which there was definite adenofibromatous prostatic hypertrophy of the type formerly removed by prostatectomy. It is well known that patients with a small median bar or with a contracted vesical neck often persist in having recurrent obstructive

symptoms no matter what surgical procedure is employed. However, if only the cases in which a malignant condition was present are excluded, the recurrence amounts to 2.7 per cent. In arriving at this figure the 451 cases of 1933 are not included, although any recurrence encountered during that year has been included. It is also interesting to note that, included in the series of 721 cases reported, are twenty cases in which patients underwent transurethral resection for recurrent obstruction after prostatectomy performed at the clinic or elsewhere. There seems to be little difference, therefore, in the percentage of recurrence after either prostatic resection or prostatectomy. Since more patients will survive resection than will survive prostatectomy, there may be a slightly greater incidence of recurrence over a period of years.

Conclusions

1. Transurethral prostatic resection is applicable in practically all cases of obstruction of the vesical neck which require operation.
2. Thorough physical examination and laboratory study are necessary if complications are to be anticipated and avoided.
3. Preoperative drainage by inlying catheter should be instituted only in cases in which renal function is definitely impaired. It is a mistake to employ such drainage in an attempt to reduce infection either in the prostate gland or in the bladder, or in an attempt to reduce the size of the prostate gland.
4. Resection should be thorough; most of the obstructing tissue will be found in the vesical neck.
5. Early reoperation is indicated in cases in which a poor functional result follows primary resection.
6. A mortality rate of less than 1 per cent can be expected.
7. Recurrence will probably be in inverse proportion to the thoroughness of resection. It should be little if any greater than that which follows prostatectomy.

THE PALLIATIVE TREATMENT OF TIC DOULOUREUX*

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THIS presentation will be devoted entirely to the subject of tic douloureux and the palliative treatment thereof by alcoholic injections. This condition is one entirely distinct from all other forms of facial pain. It is a clinical entity, the cause of which is unknown, with paroxysms of severe unilateral pain of a cutting, piercing character through some part of the distribution of the trigeminal nerve. The pain usually can be precipitated by stimulating the area of the nerve distribution of the division affected. This may be by touching the skin, by a cold breeze striking the affected side of the face, and often by talking, chewing or swallowing. If swallowing precipitates pain, glossopharyngeal neuralgia must be differentiated. Between paroxysms no pain is present. Examination reveals no neurological changes in the area supplied by the nerve affected except when the so-called "trigger-zones" above described are present. It is particularly important that the fact that tic douloureux is a distinct entity be borne in mind constantly when treatment of facial pain is considered, for any form of treatment that breaks the conduction of nerve impulses in the trigeminal nerve at any point between its entrance into the pons and the affected nerve endings will relieve the pain. Such form of treatment, however, will be ineffective in other forms of facial pain and usually will aggravate the symptoms of the patient. This interruption of the impulses in the fifth cranial nerve may be accomplished by: (1) resection of the terminal branches if the condition is limited to these; (2) the injection of the affected nerve with substances which temporarily destroy its function, as, for instance, alcohol, which is generally used; or (3) radical operation.

We rarely see patients now who have had a recent nerve resection for the relief of this condition, as alcohol injections have largely replaced this operation.

I desire to present briefly a case history which illustrates the characteristics of tic douloureux.

*Presented before the Minnesota Society of Neurology and Psychiatry in connection with the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Case 1.—Mrs. I. H. Age twenty-four. Referred by Dr. A. J. Hammond, Minneapolis. The patient was seen by Dr. Ball first on November 10, 1924. Pain had begun about a year before in the right third division. It had been thought at that time that it was probably due to the right lower first molar but removal of this tooth made no difference in the pain. At first pain came in intervals, sometimes with a week's freedom, sometimes a month's, but became progressively more severe until in July of 1923 she had been injected elsewhere. This completely stopped the pain until it had recurred mildly about two weeks before her visit. She had never had pain in the first or second divisions. The third division was successfully injected November 10, 1924, by Dr. Ball, with complete relief. On October 1, 1925, the third division was again injected by Dr. Ball as pain had recurred a short time previously. The patient reported next on July 29, 1929. A short time before she had developed moderate pain in the right lower teeth and gums. Eating or talking would precipitate pain, as would placing her tongue against the teeth of the right lower jaw. The right third division was reinjected by Dr. Ball that day. On April 9, 1933, the patient was seen by the writer. Severe tic pains had recurred two days previously with the trigger area now changed from the right third to the second division, as touching the face in the region of the right lower lid would start pain. It was thought probable that a trigger zone was present in the first division also as the patient had observed that scalp treatments of late had been somewhat uncomfortable and in the past two days pain had come occasionally when touching the right upper eyelid. Many paroxysms of tic occurred spontaneously, however, so there was uncertainty as to how many divisions were involved. The right second division was injected satisfactorily. Two days later the patient returned and was very much better but said she had had one severe tic pain through the supraorbital and infraorbital region, but no trigger zone could be found. A supraorbital injection, however, resulted in complete relief for the patient. On February 22, 1934, she returned requesting that the deep alcoholic injection be repeated as she had had recurrence of the tic pains two days previously. These were coming several times a day and were very severe, with a trigger area in the distribution of the right supraorbital branch and also the right second division. We advised the patient that she should not continue with alcoholic injections and referred her to Dr. A. W. Adson for radical operation. In his absence she was operated upon by Dr. W. McK. Craig, who on February 26 divided the posterior root of the right gasserian ganglion. Upon returning home

she reported that she was completely satisfied with the result of her operation.

The above case shows the following characteristics of this condition:

1. Paroxysms of severe pain with intervening intervals of complete freedom of symptoms lasting from a few moments to several hours.
2. "Trigger areas" or as sometimes called, "dolorogenetic zones" which precipitate paroxysms of pain when stimulated.
3. Periods of relief following deep alcoholic injection with later recurrences.
4. Relief following a proper radical operation, which is permanent.

However, cases are seen of so-called atypical tic douloureux and these always present a problem both in diagnosis and in treatment. The first case of this type (Case 2) that we desire to report is one with a true tic douloureux, apparently, in whom, for some unknown reason, pain was replaced by paresthesias in the distribution of the nerves injected even though good objective analgesia resulted. On his own initiative, he then decided to have the radical operation and selected a highly competent neurological surgeon to perform it. The surgeon who operated upon him later informed the writer that he would not have performed the radical operation had he not been misled by the patient's statement that he had been relieved following some of his deep alcoholic injections.

Case 2.—Mr. M. W. G. Age sixty. Referred by Dr. Alfred Hoff, Saint Paul, Minn. The patient had had pain in the right side of the face for a year. This was first thought due to an infected lower tooth, which was extracted. The pain then was transferred to the next tooth and so on until he had four lower teeth removed without relief. Touching the right lower lip or right lower second incisor, eating, spitting or talking would bring on a paroxysm of pain. These had become so frequent and so severe the previous week that he had scarcely been able to eat or to talk at all. He had a definite "trigger" in the upper right cuspid and another in the outer border of the right lower lip. The writer saw the patient in the temporary absence of Dr. Ball on January 17, 1925, and attempted to inject the right third division but was unsuccessful although the needle was introduced as far as 5 cm. The right second division, however, was successfully injected the same day. The patient was seen five days later and still had pains in the distribution of the right second division, which he said returned almost immediately after the injection and had been as severe as before. The right second division was re-injected that day. He was seen next on February 9. He then complained bitterly of paresthesias of the cheek

bone of the right side consisting of disturbances of sensation which he described as burning, crawling feelings. The injections were interrupted and the patient was placed upon a sedative. He was seen several times from then until April 7, when Dr. Ball returned and was asked to see him. He had no tic pains but was still very uncomfortable because of the sensations described, but these now were most noticeable, he said, in his right eye. He also complained of feeling very nervous. In view of the good analgesia still present in the right second division, no successful injection of the third and a history of a mild trigger zone in the right lower lip, Dr. Ball suggested a deep injection of the third division. The writer on the following day successfully made the injection, striking the nerve at 4.5 cm., but the patient was unrelieved. On the eleventh, Dr. Ball injected the third division, making a good injection, but the pain was unchanged. On the fifteenth he injected the second division and repeated it on the twentieth, which was the last time we saw the patient. On December 27, 1925, we had a letter from him stating that after our last treatment he had the radical operation performed and wrote, "I have worked only six days since February. I think I can say with the melancholy Dane that 'It were better to bear the evils we have than to fly to others we know not of,' and wish I had borne my ills rather than to try to remedy them with the present result."

Case 3.—Mrs. S. W. Age forty-one. Referred by Dr. R. C. Radabaugh, Hastings, Minn. Eight months before on two successive days the patient had had paroxysms of severe pain through the right side of her cheek running into the forehead and eye of that side. Blowing her nose would precipitate a paroxysm of pain. This had recurred and been present for about a month when first seen by the writer on January 23, 1932. Touching the inside of the right naris, eating or talking started pain typically tic-like. She said it felt as though she had some sharp object stuck in her right nostril. When pain was severe, her right eye watered. Her nose and throat had been checked by a very competent specialist during that week with negative findings and he had cocainized the sphenopalatine ganglion without relief. Dr. Radabaugh was informed that the case was atypical but in all probability would prove to be tic douloureux but we recommended that injections be deferred. The patient continued to have symptoms at varying intervals and on February 7, 1932, the writer made a successful deep alcoholic injection of the right second division. After this it was not possible to start pain by touching the former trigger zone inside the right nostril. On April 9 a letter was received stating that she has "bad pains in the back of the head and face is quite sore" and asked for something to relieve the pain. She was referred back to her physician, who was advised to place her on a sedative. On December 15, 1932, the patient returned, stating that she had developed tic pains in the former location associated with a constant pain in the back of her head on the right side, which she described as feeling as though her head were being bolted together, and this feeling was so

severe that she could not lie down at night. The writer successfully reinjected the right second division. On June 18 of this year the patient reports: "My facial nerve condition is pretty fair now but last year, August, 1933, I took chiropractic treatments and got very good results. Since then I have been feeling pretty good, no pain in the face, but *my head is painful* at times."

It will be observed that the writer's original impression was that this was a doubtful case of tic douloureux and this opinion is unchanged. This patient is the type of case that should be carefully studied before radical operation is recommended and it would be much wiser, if severe tic-like pains recur, to resume the deep alcoholic injections, at least until the diagnosis is clear.

The following is an atypical case in which either deep alcoholic injections or radical operation is clearly contra-indicated.

Case 4. Miss R. Y. Age twenty-nine. This patient reported to the writer on January 19, 1934, for deep alcoholic injection. She stated that for the past seven years she had had a pain in the left lower jaw for which various things had been done without relief. Careful inquiry revealed that the pain ran mainly through the left lower jaw but sometimes ran well over into the right lower jaw and sometimes into the shoulder and neck of the left side. The pain always is worse during cold weather or when she becomes fatigued, but is constantly present to some degree during her waking hours. It does not awaken her, however, though it may interfere with her falling asleep. The patient said she came here because she had "tried everything" to secure relief of this condition and now wondered if deep alcoholic injection might be helpful. Among the things she had had done: Her teeth had been examined very carefully and all suspicious ones extracted; a septum operation had been performed. Following this she spent ten months at home resting but without benefit. She then had her sinuses irrigated several times though no pus ever was found. This surgeon then suggested that she try general massage. She had just completed a long course of these treatments, but had become very nervous and tense and was having more pain than before they were started.

The patient was advised that the condition was not tic douloureux and would not be relieved by deep alcoholic injection. She was placed on a mild sedative and instructed to continue at her work, avoiding undue fatigue and including in her program a reasonable amount of diversion and recreation, which she had largely given up. Her condition is greatly improved and she has continued her work regularly, although she still has her symptoms to some degree.

She stated that more than a year before she had seen Dr. F. P. Moersch, who had told her that he did not believe that it was probable her condition was one that would require surgical treatment, but if the pain

continued, she should consult some neurologist again. Dr. Moersch was kind enough to send the following report:

"We were privileged to see Miss R. Y. in August of 1932. Her general physical examination, including routine laboratory tests and x-ray of sinuses, proved to be entirely negative throughout. Because of the pain in the face she was sent to our department for opinion. She stated at that time that about six years previously she had the onset of a steady, dull ache in the left upper jaw. This came on about a year and half after the mumps and while she was having some dental work done. Since the onset she told us that the pain had never let up and that she felt that it was steadily growing worse. For about six months prior to her visit here she felt that the pain was interfering with her sleep. She also told us that the trouble was worse in cold or damp weather but the pain had been more severe than ever during the months preceding her visit here. The neurological examination proved to be entirely negative throughout. We felt at the time that there was no indication for any surgical treatment and advised Miss Y. to return to work and try and get along with as little medication as possible and that if her condition became too trying she should place herself under the observation of a neurologist. From our record it appears that she belongs in the group of chronic persistent facial pains that are always so difficult to remedy."

The technic we follow in alcoholic injections for tic douloureux is that which, with certain modifications, our late associate, Dr. C. R. Ball, began to employ in 1908¹ after he had heard Dr. Hugh Patrick report fifteen cases successfully treated by him in this way. The first case in which Dr. Ball employed it involved the third division of the fifth nerve. The directions given by Dr. Patrick for the injection of the second and third divisions as they emerge from their respective foramina in the skull were followed, as is still our custom. To make the deep injection we use a special 20-gauge steel needle made for this purpose, 6 cm. in length and having a sliding device which may be set to prevent danger of introducing the needle to an excessive depth. In the first case treated by Dr. Ball, 75 per cent alcohol was used. Later the special solution of alcohol and cocaine recommended by Dr. Patrick² was adopted:

Cocaine Muriat	0.1
Alcohol	13.5
Aq. Dest. q.s. ad.....	15.5

Subsequently the following modification was adopted:

Cocaine Muriat	0.195
Distilled Water	4.0
Alcohol 95 per cent q.s.....	90.0

Ordinarily from 1 c.c. to 2 c.c. are given in a deep alcohol injection. In the superficial injection, not over 0.5 c.c. is injected where the branch, such as the supraorbital, makes its exit from the skull. Sometimes in debilitated cases we omit the cocaine but then the local pain following seems intensified.

The nurse prepares the affected side by wiping it carefully with alcohol. The injections are ordinarily made using no anesthetic except to infiltrate with novocaine the site for injection after Tr. iodine has been applied to this area. We feel that it is desirable that the patient be conscious because his coöperation in indicating whether pain is felt down the course of the nerve is helpful in locating it and, furthermore, successful injection has occurred only when analgesia results in the distribution of the nerve injected. The determination of this requires a conscious patient as it is indicated by loss of pain to pin prick and this test should be made before treatment is completed.

Our deep injections include the second and third divisions only, as too great danger is attendant upon attempting to inject the first. Frequently the supraorbital branch of this division is injected, however. If the dolorogenetic area is in the first division and outside of this branch, radical operation only will afford relief. It is rare that we make any injections of the superficial branches of the second or third divisions. In cases where an injection of the mandibular branch only is indicated, we refer the patient to a dentist experienced in this particular field.

In all cases, after thorough routine physical examination has been done, a careful neurological examination is made to rule out any organic lesion that might cause pain in the area of the trigeminal nerve. The patient is advised to have infection of sinuses or teeth eliminated. If the pain is mild and especially so if atypical, alcohol injections are deferred until the infection has been removed and the effect observed, but if the symptoms of tic douloureux are distinct, the deep alcoholic injections are completed first.

Of the cases of tic douloureux treated with deep alcohol injections since 1910, there are 171 whose records are sufficiently complete to serve

the purpose of an analysis of the results of this form of treatment. Of these, 100 were females and seventy-one males. In analyzing 148 histories where data as to age were available to determine when the onset of symptoms occurred, this was found to be fifty-eight years both for females (90) and males (58). The youngest patient was nineteen and the oldest was eighty-nine when first injected. The shortest time injection was made after initial pain had occurred in the first attack was ten days and the longest time was twenty-six years. The average length of time before injection was made was sixty-eight months in fifty-five males and seventy-seven months in seventy females.

The histories of 141 indicate clearly the divisions involved at the time of the first visit, which were as follows:

Right first division.....	1
Right second division.....	23
Right third division.....	35
Right first and second divisions.....	4
Right second and third divisions.....	27
Right first, second and third divisions.....	3
	—
	93
Left first division.....	2
Left second division.....	12
Left third division.....	13
Left first and second divisions.....	1
Left first and third divisions.....	1
Left second and third divisions.....	18
Left first, second and third divisions.....	1
	—
	48

In many instances other divisions of the same side became involved later. In four of our total series of cases, later involvement of the opposite side was reported. In one of these the involvement was so mild that thus far he has not required active treatment but three patients had severe involvement, two of them being treated by deep alcohol injections by the writer and one reports being relieved elsewhere by mandibular block with alcohol.

A follow-up was undertaken in June, 1934, of the 171 patients treated by this method since 1910 when we began to keep our records. To eight no questionnaires were sent because of incomplete addresses. Forty-six did not reply, thirty were returned unclaimed and it is fair to assume that of these seventy-six, practically all are deceased in view of their age when seen

and the length of time elapsed. In addition to these seventy-six, there are thirty-two reported deceased with no statement of condition subsequent to our last treatment. Of the remaining fifty-five whose subsequent condition could be determined, five were reported deceased, four having been comfortable since our last injection was given until death and one having had deep alcoholic injections elsewhere with relief. Twelve had had radical operations, five of these without further intervening alcohol injections. Of the twelve operated, three had died immediately following it. Two of these were operated by recognized neuro-surgeons but one of these patients, seventy-three year of age, was recognized as a very poor surgical risk. Of the nine surviving the operation, eight have had permanent relief of symptoms and one no relief (case 2 reported herein). Seven of the fifty-five had had subsequent alcohol injections elsewhere, four being relieved and three unrelieved until radical operation was performed. One, aged fifty, reported three years ago for reinjection and was advised to have the radical operation instead. He has secured relief by using inhalations of trichloroethylene only for several subsequent remissions and is free from pain at present. This is the only patient in our series who has been appreciably relieved by this preparation. One has had no recurrence in the side originally involved since his last injection four years ago but reports that the other side became involved a year ago. Thirty-two of the fifty-five report they have had no further treatment since our last injection. Of these, twenty-one are free from symptoms and eleven have occasional mild pains but not sufficiently severe to require injection.

The average period of relief from deep alcoholic injections has been from one to two years. One patient reported that he had a recurrence, however, one month after being successfully injected and then had radical operation with relief. Two did not suffer recurrences until after ten years. One, injected twelve years ago, had no recurrence for seven years and only recently have the attacks become severe. She plans to be reinjected.

Of those now free from pain, one has been so for seven years though her face is sensitive to cold; one has had no treatments for eleven years and reports she is feeling fine but has had a few mild, brief recurrences, the last one a year ago, all disappearing spontaneously. One has had no treatments for nine years but has had a few mild recurrences, the last three years ago, all stopping spontaneously, and one, already mentioned, has had no tic pains on the side injected in 1930 but the other side became involved last year. An alcohol block of the mandibular branch done elsewhere relieved him until recently when mild pain recurred in this branch.

Conclusions

- I. Tic douloureux should be recognized as a distinct clinical entity and effective treatment instituted promptly.
- II. Injection of the affected divisions or branches with alcohol should be employed:
 - A. In recent cases of tic douloureux
 - (1) To relieve the symptoms of the condition.
 - (2) To verify diagnosis before radical operation.
 - (3) To demonstrate to the patient temporarily the numbness which will be permanently present if radical operation is performed.
 - B. In recurrent cases of tic douloureux
 - (1) If patient's condition is unfavorable for radical operation.
 - (2) If radical operation is refused.
- III: The recurrent case should be urged to have the radical operation while still a good surgical risk in view of the limitations of palliative treatment.

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MEDICAL ASPECTS OF THE COMMONER INDUSTRIAL POISONINGS*

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ALTHOUGH industrial poisonings are as old as civilization, it was only with the advent of the machine age that they gradually became more common and at times alarming. During the past several decades, much illuminating work has been carried out to show prevalent dangers, and satisfactory progress has been made in the prevention and treatment of many forms. However, at the present time, with industry changing rapidly, many dangers are still with us and at times poisonings become quite common. From our standpoint, the most common and dangerous forms are those poisonings produced by arsenic, lead and carbon monoxide.

Arsenic is one of the most dangerous industrial hazards that we have. Its chief sources, from the standpoint of industrial poisonings, are its presence as a contaminating agent in lead and lead alloy products, pigments, coal tar products and commercial acids, and its use in insecticides and rodent poisons such as Paris Green and lead arsenate.

Sollmann in his Manual of Pharmacology gives the toxic dose of arsenic trioxide as 5 to 300 mgm. From the larger of these doses effects may come on in a few hours and result even in death in from a few hours to several weeks. From the smaller dosages, especially if taken repeatedly, the effects tend to come on slowly over a period of days to weeks or months. In this connection it might be well to recall that the U. S. P. dose of arsenic trioxide is 2 mgm.

With these dosages in mind you can all see the dangers associated with the use of arsenic. You can also see that anyone who handles an arsenic-containing substance, or who inhales arsenic-containing dust or whose skin becomes covered with an arsenic-containing dust or spray, is a potential case of arsenic poisoning. This is especially true when it is remembered that arsenic can be absorbed by the human body from the respira-

tory tract, the gastrointestinal tract and even the intact skin.

The first effects of arsenic upon the human body are, as a rule, local effects, manifested where the substance comes in contact with living tissue. The reaction is similar to a local inflammation, in that there is slow death of the cells, due probably to a combination of the arsenic with the cell proteins. Underneath this region there occurs a capillary dilatation. These effects are seen most frequently on the skin or the mucous membrane of the nose.

Later, after systemic absorption, symptoms of acute poisoning are produced which may be classified as follows:

- a. Symptoms of gastroenteritis: dry mouth, thirst, vomiting, abdominal pain with diarrhea, stools which may contain mucous shreds or blood.
- b. Symptoms due to effect on circulatory system: dilatation of blood vessels with resulting low blood pressure and feeble or irregular pulse. Cardiac failure may result in collapse and death.
- c. Symptoms due to effect on nervous system: Cramps in legs, restlessness, great prostration, convulsions, paralysis. Exhaustion and collapse may produce death. Within a few days, if death does not occur, there is apt to be added to the above, jaundice and albuminuria, due to fatty degeneration of the liver and kidneys produced by the arsenic.

With small but repeated intake and absorption of arsenic, the following symptoms tend to occur, developing slowly: loss of appetite and weight with other symptoms of indigestion, puffy eyelids, sore eyes, increased secretion from nose, throat and larynx, ulceration in the mouth, perforated nasal septum, muscular weakness, dry falling hair, brittle nails and skin eruptions, symptoms produced by fatty degeneration of all organs, especially liver, kidneys and heart mus-

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cle and changes in peripheral nerves leading to polyneuritis, muscular atrophy, disturbances of sensation and changes of special senses such as blindness.

The chief sources of lead poisoning with which we must contend are lead and its alloys, paint, enameling and pottery industries, printing, storage batteries, insecticides such as lead arsenate, and possibly lead-containing motor fuels.

Lead is not so apt to produce an acutely fatal reaction as is arsenic. The body apparently can tolerate more of this metal, for Sollmann gives as the acutely fatal dose, from 10 to 50 gms. of soluble lead salts. However, 1 gm. or less can produce serious poisoning. An absorption of as little as 1 mgm. per day can produce toxic symptoms after several weeks to years. This is due to the fact that cumulation occurs because the average daily excretion amounts to not more than 0.5 mgm. One of the most interesting and important things to remember is that human beings show very marked variations in their susceptibility to this metal, hence possible danger is always present. Lead absorption can occur from any part of the body, with the possible exception of the intact skin. The most rapid absorption has been shown to occur from the respiratory tract due to inhalation of lead-containing dusts and sprays, and fumes from the molten metal.

The symptoms of acute lead poisoning may briefly be grouped as follows:

- Symptoms of gastroenteritis: sweetish metallic taste, nausea, vomiting, severe colic, alternate diarrhea and constipation.
- Symptoms due to effect on the circulatory system: constriction of blood vessels with increased blood pressure, skin pallor, slow pulse, basophilic stippling of red blood cells and no leukocytosis.
- Symptoms due to effect on nervous system: headache, backache, insomnia, general asthenia, acute neuritis, ataxia of hands or feet, optic neuritis, and occasionally encephalopathy.

People who either have superior eliminative powers, or increased tolerance for lead, may not show the above picture. They may, however, after prolonged periods of exposure, show chronic lead poisoning. In these cases, in addition to the above symptoms, there may also be

present a lead line on the gums, more marked nervous involvement, and due to the tendency of lead to produce generalized arteriosclerosis, where arsenic produces fatty degeneration, symptoms associated with this pathological process are in evidence.

The diagnosis of arsenic and lead poisoning, especially the chronic forms, is not always easy. As far as the patient's welfare is concerned, it may be said, however, that any one with a history of exposure to either of these metals who complains of indefinite symptoms from the gastrointestinal tract and nervous system should be considered as a case of poisoning until proven otherwise. In many cases an absolute diagnosis cannot be made until the metal in question is isolated chemically from the urine. This can be accomplished in more than half of the cases.

Carbon monoxide is perhaps our third important industrial poison. Its chief sources with which we must be familiar are: the internal combustion engine, welding apparatus, and coal, gas and oil heating appliances. As these mechanical devices are being used more than ever before, the dangers of this poisoning are perhaps greater than ever before.

Carbon monoxide is a colorless, odorless, non-irritant gas. Therefore it gives no warning of its presence. It is present in artificial gas from about 4 to 10 per cent. It is formed by the incomplete combustion of natural gas, oil and coal. It is present in the exhaust gas of an automobile up to 6 per cent.

The affinity of hemoglobin for carbon monoxide is 210 times its affinity of oxygen, so you can easily realize how rapidly it will be taken out of the inspired air. When the hemoglobin is 20 per cent saturated with carbon monoxide, dizziness and increased respiration occur; with 50 per cent saturation, unconsciousness occurs; and with 60 to 80 per cent saturation, death occurs. As little as .05 per cent carbon monoxide in inspired air will give beginning toxicity and may produce hemoglobin saturation of 14 to 27 per cent in from one to five hours. This concentration represents five parts of carbon monoxide in 10,000 parts of air. A concentration of .07 per cent in inspired air will produce severe toxicity and a .2 to .4 per cent concentration will produce death.

Acute carbon monoxide poisoning shows

largely the symptoms of asphyxia, without cyanosis. This lack of cyanosis is due to the fact that carbon monoxide hemoglobin is pink. At first there is a rise of blood pressure, during which apoplexy can occur; later there is low blood pressure, and deep and difficult respiration. There may also be headache, dizziness, loss of memory, anesthesia, loss of spontaneous power of movement, and convulsions, followed by unconsciousness. When death occurs it is due to respiratory paralysis. Recovery may be rapid or the return to consciousness may occur slowly with prolonged headache, weakness, and loss of pain sensation, and muscular paralysis may be present for days. Pulmonary and nervous complications may occur due to fatty degeneration of the parts affected.

Chronic poisoning may occur with 4 per cent blood saturation of carbon monoxide. This amount can accumulate from as little as one part of carbon monoxide in 20,000 parts of inspired air. The symptoms of this form of poisoning are similar to those of the acute form. They develop more slowly and show chiefly altered digestion, weakness, headache, dizziness, loss of memory and slow intellect.

Other essential factors in the diagnosis of carbon monoxide poisoning are to be obtained from the history of exposure to exhaust or burned gases, and from the spectroscopic examination,

and qualitative tests of the blood for carbon monoxide-hemoglobin. One of the latter would be to dilute some blood with water, then later add a small amount of alkali. Under these conditions normal hemoglobin soon changes to brown and green, whereas carbon monoxide-hemoglobin remains pink.

In conclusion, I wish to emphasize that though these poisonings are old and world-wide we should none the less not lose sight of them. We ordinarily think of these poisonings on the one hand as belonging to large industrial centers. Yet, on the other hand, industry is moving to small communities and even farms, so that the future may show a greater incidence of these poisonings outside the large cities. It is the chronic type that may be the more common in the future, because the general population is becoming better educated to the acute dangers. As we have around us the increasingly common use of the automobile, the aeroplane, the motor boat, the welding apparatus, and gas, oil and coal for heating purposes, we should be alert to the danger of carbon monoxide poisoning. As we still use paint, printer's ink, other lead products such as plumbers' supplies, storage batteries and rodent and insect sprays and baits, we should remember arsenic and lead as important causes of industrial poisonings.

THE TREATMENT OF THE COMMONER INDUSTRIAL POISONINGS—LEAD ARSENIC AND CARBON MONOXIDE*

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Treatment of Lead Poisoning

AFTER lead has been absorbed into the blood stream, a small fraction of it continues to circulate in the blood stream, being found in both the plasma and erythrocytes as colloidal tertiary lead phosphate. The greater portion of the lead is, however, stored in the hard bone of the skeleton as tertiary lead phosphate. The onset and severity of the symptoms of chronic lead poisoning are in large measure controlled by the

relative balance between the lead circulating in the blood stream and that stored in the bones.

Conditions which favor the storage of lead in the bones decrease the concentration of lead in the blood, reduce the excretion of lead, and relieve (or prevent the onset of) the symptoms of chronic poisoning. Conditions favoring the mobilization of lead, conversely, result in an increased concentration of lead in the plasma and red cells, increased urinary excretion of lead, and, if the mobilization of the lead is sufficiently rapid, symptoms of chronic poisoning will be produced.

*From the Department of Pharmacology, University of Minnesota, Minneapolis. Read at the annual meeting of the Minnesota State Medical Association, Duluth, July 18, 1934.

The lead stored in the bones, therefore, while inert as long as it remains in the bones, constitutes an ever-present danger to the patient because (a) the continued presence of lead in the circulation possibly years after exposure to the lead has ceased may result in fibrous and sclerotic pathological changes in various organs and (b) dietary changes or totally unrelated pathological conditions favoring mobilization of the lead may cause symptoms of chronic lead poisoning to develop and be superimposed on other serious disease conditions.

The storage or mobilization of the lead is readily controlled by varying the calcium and phosphorus balance. Conditions resulting in a positive calcium balance with a low phosphorus intake cause storage of the lead in the bones and relieve the symptoms of poisoning. This may be accomplished by the administration of calcium lactate or calcium gluconate, and by the use of a diet high in calcium, especially milk, eggs, green vegetables and fruits (except apples and bananas).

There are a number of factors which favor mobilization and excretion of the lead. A low calcium-high phosphorus diet causes rapid mobilization and excretion of the lead. Foods low in calcium include meat, potatoes, rice, macaroni, milk-free bread, apples, bananas, sugar, salt, and butter which has been melted and skimmed off the top of hot water. Foods having a high phosphorus content include lamb, liver, eggs (high Ca), halibut, whole wheat bread, potatoes and green peas.

Acidosis, clinical or pathological, markedly increases the mobilization and excretion of lead. Clinical acidosis may be produced by the administration of acids such as hydrochloric, lactic or phosphoric acid, or ammonium chloride (8 to 12 gm. per day). Diluted phosphoric acid, U.S.P., 20 to 25 c.c. per day, well diluted and sweetened to resemble lemonade, is particularly effective since it provides a high phosphorus intake as well as producing acidosis. The excretion of lead is increased about four times.

It is well to bear in mind that pathological conditions causing acidosis, *e.g.*, diabetes, overexertion, anesthesia, etc., may cause symptoms of chronic lead poisoning to develop in patients who give no immediate history of exposure to lead, and who indeed may not have been exposed to lead for years.

Treatment of Arsenical Poisoning

The storage of arsenic in the tissues after absorption is markedly different from the storage of lead. After absorption arsenic is stored in all tissues of the body, principally in the liver, kidneys, heart and hair, and to a lesser extent in the skeletal muscles and brain. The exact form of its combination in the body is not known, but it has been identified in the liver of dogs as an arsenical nucleoprotein.

The excretion of arsenic is slow, requiring up to seventy days after repeated exposure or administration, but, of course, is much less persistent than lead. Unlike lead poisoning, the storage or excretion of arsenic cannot be influenced by dietary means.

The best treatment for chronic arsenical poisoning is the combined internal and external use of sodium thiosulphate (Na hyposulphite, photographer's "hypo"). The mechanism of its usefulness is not known. McBride and Dennie (1923) advocated the use of sodium thiosulphate particularly in the treatment of cases of arsenophenamine dermatitis. These workers claimed that the thiosulphate converted the arsenic into insoluble and non-toxic sulphides, but this does not appear to be true since thiosulphate does not increase the fatal dose of arsenic. Myers (1925) has shown that thiosulphate increases the excretion of arsenic in a percentage of cases.

Sodium thiosulphate may be administered internally either orally or intravenously in doses up to 2 gm. per day, and externally as a 1 to 2 per cent aqueous solution. Externally it is extremely effective in treating and preventing the arsenical dermatitis and mucous membrane lesions of persons coming in contact with arsenic-containing dust.

Sodium thiosulphate is also effective in treating other forms of chemical and drug dermatitis. It has been employed particularly in the treatment of poisoning with other heavy metals, especially mercury, in which it is quite effective, and lead, in which the results are of doubtful value. It has been used with considerable success in the treatment of dermatitis due to sensitivity to drugs, especially the barbitol hypnotics, the coal tar antipyretics, and bromides.

Treatment of Carbon Monoxide Poisoning

Carbon monoxide poisoning is essentially an asphyxia of the blood stream, the carbon mon-

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oxide being combined with the hemoglobin of the erythrocytes with an affinity more than 200 times that of oxygen. It is equally important to bear in mind the fact that asphyxia and respiratory failure are not the same thing. A patient may be very seriously asphyxiated with carbon monoxide without showing any immediate paralysis of the respiratory center; in fact, for several hours the respiration may be increased. The chief aim of the treatment of carbon monoxide poisoning should, therefore, be to restore the oxygen-carrying power of the blood.

Most of the treatments proposed for carbon monoxide poisoning have been the hypodermic administration of respiratory stimulants such as metrazol, homocamfin, alpha-lobeline, and atropine, although they do not strike at the real cause of the poisoning.

The use of methylene blue (methylthionine chloride) has been extensively advocated recently in the treatment of carbon monoxide poison-

ing as well as in hydrocyanide poisoning. Since Wendel (1933) has shown that methylene blue acts by converting hemoglobin to methemoglobin, with which the carbon monoxide then combines to form carbon monoxide methemoglobin, it is apparent that the administration of methylene blue in carbon monoxide poisoning can do only harm by still further reducing the oxygen-carrying power of a blood already in an advanced stage of asphyxia.

The most satisfactory treatment of cases of carbon monoxide poisoning is the use of inhalations of oxygen containing 7 to 10 per cent of carbon dioxide. This maintains respiration, oxygenates the blood to its fullest possible extent and with each respiration washes out some of the carbon monoxide. In New York City, where such treatment has been in routine use for the past six years, the annual number of deaths from carbon monoxide poisoning during that period has been 611, 570, 525, 435, 305 and 278.

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ACUTE PERFORATIONS OF THE GASTRO-DUODENAL AREA, WITH SPECIAL REFERENCE TO THOSE OF TRAUMATIC ORIGIN*

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In much of the literature dealing with acute perforations of the stomach or duodenum, we find the apparently innocent remark "that these perforations may at times be of traumatic origin." And because so little attention is usually given to these traumatic perforations, one finds little in the literature concerning them.

It is recognized that there is an "area of gastric vulnerability"—the projection of the stomach on the anterior abdominal wall. Normally the stomach is to the left of the liver, between it and the left costal cartilages. Frequently it passes to the right of the median line; most always, if distended. In the median line the stomach area measures some 2.5 to 4 cm. and its lower border, as the greater curvature, slopes upward and to the left. The variation in the size and position of the stomach is so great that it is entirely conceivable

that almost any kind of trauma to the abdominal wall may involve the stomach.

The following cases are from a group of eleven perforated ulcers seen over a period of ten years. Of these eleven patients, nine recovered and two died (mortality 18.2 per cent). Ten were in men; one of the fatal cases a woman. Age incidence was from twenty-two to fifty-seven, with an average of 34.6 years. Hospital days, excluding the two fatal cases, were from eleven to forty-three days, with an average of fifteen days. Of the two fatal cases, one died the day of operation, the other four and one-half days post-operatively, both from peritonitis. The time between the onset of symptoms and time of operation varied from one hour to four days. The average elapsed time for these cases of traumatic origin was slightly under three hours. Of the three patients operated on after twenty-four hours, two died.

The cases of traumatic origin are briefly summarized as follows:

Case 1.—Laborer, aged thirty-four, employed by a trucking concern, as helper. While unloading cartons of crackers, which were being thrown from the truck to the helper who stood on the sidewalk, he was struck by a corner of a wooden box directly in the abdomen. This occurred at 10 a. m., three and one-half hours following breakfast. He had no great discomfort for about ten minutes, when he was seized suddenly with great abdominal pain. He was helped into the truck,

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laid on the floor, and was brought to the office. He was in great pain, but not in shock.

Examination showed temperature normal, pulse 88, breathing slightly increased and painful. There was complete constant rigidity of the abdomen. The leukocyte count was 8,600 (71 per cent p.m.n.). There was no history of any previous stomach ailment. Pain and rigidity were so marked that he was operated on about seventy minutes following the accident. A small soft ulcer, 2 mm. in diameter, was found in the duodenum. Simple closure of the ulcer was done, the abdomen being closed in layers without drains. Recovery was uneventful. Compensation was allowed.

Case 2.—Automobile mechanic, aged forty-two, was underneath a large sedan adjusting the brakes, when the jack slipped from the front axle and the car dropped upon him, the oil pan of the motor striking his abdomen. When the car came to rest after the rebound from dropping, the man could be pulled out from beneath the car so that the impact of the falling car was the immediate and only causative factor in his accident. There was immediate severe abdominal pain.

The man was seen shortly after the accident. The pulse was 92, temperature 99.2, leukocyte count 9,600 (76 per cent p.m.n.). There was severe pain and a most marked persistent rigidity.

At operation, a small soft ulcer in the duodenum was found perforated. Simple closure was accomplished without drainage. Recovery was uncomplicated. Compensation allowed.

Case 3.—Laborer, twenty-two years old, employed by a house mover. While helping to locate rollers under a large house, using a chain wrench, the roller slipped and the long handle was swung violently backwards, striking him across upper abdomen. The blow "knocked the wind out of him," but in a few minutes he recovered. This accident occurred about 30 minutes prior to the usual hour to cease work. On the way home from work, riding in an auto, he was taken violently ill with severe abdominal pain and vomiting.

He was seen at his home about one hour following the accident. In this interval he had vomited a "dozen times." There was marked pain, constant in character, with complete rigidity. His temperature was 97.6, skin cold and clammy, pulse 104. He was brought to the hospital, where operation two hours after injury revealed a soft type, small perforated ulcer of the duodenum. Simple closure was made without drainage. Recovery was uncomplicated. His leukocyte count immediately prior to operation was 8,600. This case was denied compensation on the basis that disability was not "immediate and continuous."

Case 4.—A man, aged forty-three, manager of a small chain department store. This man had the well deserved reputation of being a hard drinker. About five o'clock one afternoon he became engaged in a quarrel with one of his employees, the quarrel ending by the employer being punched violently in the abdomen by the attacking employee. The man was assisted to his living quarters in one of the hotels, where he promptly increased his pre-existing state of intoxication by drinking a large quantity of whiskey. About three hours after this, the hotel clerk called to see the man, as he was "drunk and very noisy."

When seen, the man presented the classical picture of intoxication. It was entirely impossible to obtain any information from him, and no history of the accident was known until the next day. He had been vomiting, so gastric lavage was done and the man given a hyoscine-morphine-cactine tablet (No. 1) hypodermically.

About an hour later, I was again called to see the man, because he was "still very noisy." A rather different picture presented itself on this second visit. The man presented evidence of shock, with cold perspiration and subnormal temperature. His leukocyte count was 38,000. At almost clock-like intervals, he

would be seized with severe abdominal pains. The interval was just under two minutes, and the pain would last about twenty seconds, when there would be apparently complete relaxation until the next attack. He had vomited several times since the lavage, but never any macroscopic blood. Over the right lower quadrant was a well healed scar, measuring 3.5 inches in length. It was felt that this ruled out any possibility of this condition being of appendiceal origin. (Later it was learned that this scar was from a bayonet wound and that the appendix had never been removed.)

A diagnosis of a perforated ulcer was confirmed at operation, which was done about six hours after the initial injury. In this case the ulcer was found on the gastric side of the pylorus, anteriorly and above, measuring 5 mm. in diameter and with induration around it. A marked chemical peritonitis likewise existed in this case. The ulcer was excised and a gastroenterostomy performed. A soft rubber drain was used and removed on the third day.

This man had a very stormy convalescence, being complicated by delirium tremens. He recovered after a hospital stay of forty-three days. Strange to relate he was granted compensation for the injury and its consequences, on the basis that the injury occurred "in line of duty."

Case 5.—A student, aged twenty-two, while driving a small delivery truck ran into the back of a large truck parked on the highway. He was thrown forward against the steering wheel and cowl of his truck. He was brought by ambulance to the hospital shortly after the accident.

Examination showed no external injuries except marked swelling and contusion of the right knee, with an underlying shattered patella. He complained of severe pain across his shoulders, on the anterior chest wall, and in the abdomen. He was put to bed, the leg temporarily splinted and local applications to the knee applied. In a very short time, his chief complaint was the severe abdominal pain, which was constant in character, and definitely increasing in severity. There developed a generalized rigidity. There was practically no shock in this case, temperature normal, pulse only slightly increased, and a leukocyte count of 6,700.

On operation, a small soft perforation was found on the anterior wall, near the ascending distal curve of the greater curvature of the stomach. There was definite contusion of the stomach wall in this case, surrounding the perforation. A simple closure of the perforation was done. No drainage was instituted in this case, and the recovery from the laparotomy was uneventful. The patella was treated by open reduction. Compensation was allowed for all injuries received.

These five cases comprise those in which trauma was distinctly a causative factor. Whether or not there was any preexisting condition, which would have a bearing on the perforation, is impossible to state. However, a few factors are interesting which were uniformly present in each of these cases.

Not one of these five patients gave any history of a preexisting ulcer, or of any ulcer symptoms. None had consulted a physician or taken any medication. This particular question was rechecked following operation to be especially sure. Knowing the tendency of the laboring man to hide any symptoms he believes may have an unfavorable bearing on his case, the question was again asked after adjudication of their claims had been completed. All still claimed that there were never any previous symptoms.

Numerous reports have been made relative to spontaneous perforation following a heavy meal, or fol-

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lowing a barium meal for fluoroscopy. In all these reported cases, however, the accident occurred some little time after any meal, so that in all probability the stomach was empty. In this regard, it is well to recall that, though the stomach is empty, it may not be relaxed, but contracted, and under tension. Peristalsis usually begins about the middle of the organ, and consequently tension exists in both the proximal and distal portions. It would seem to me that perforation from trauma would be more likely to occur with a contracted empty stomach than at any other time, because of this tension.

Operative Procedures

Pre-operative.—Although there are many who frown upon the practice, we do use methylene blue solutions in any case where the preoperative diagnosis includes any possibility of a perforation. A small amount of sterile water, deeply colored by the dye is given to the patient before the operation. This practice definitely stains the leaking stomach contents and helps in the localization of the perforation. Time is an element in these operations, and this procedure does save time. Following closure, a clean sponge held against the operative site, with gentle pressure on the stomach, will show leakage if any exists. The argument advanced that it is another possibility for infection hardly seems justifiable, when one considers that the normally infected stomach contents are already leaking into the peritoneal cavity. Neither do I make any claim for any bacteriological effect of the dye, but I do say it simplifies the operative procedure.

Operative.—A high right rectus incision is usually advocated as giving the best exposure over the site of the most frequently perforating area. Simple closure of the perforation, using a Lembert suture rather than a purse-string, the tacking of a small omental pad on the area, may be the only repair indicated. A gastroenterostomy may be indicated, provided the patient's condition warrants any additional surgery, and if there is reason to believe that such a procedure will afterwards benefit the patient. Simple excision of the area hardly seems more practical than closure alone and pylorotomy or partial gastrectomy only increases the possibility of complications. No set rule can be laid down; each case will govern the operative procedure. Yet one can find statistics which show that each procedure is the best one.

Drainage likewise depends on conditions encountered. If the amount of fluid in the abdominal cavity is large, there is probably more logic in drainage. Ordinarily, drainage can be dispensed with in the majority of cases without need of any timidity on the part of the surgeon.

Postoperative.—Though the peritoneal irritation is chemical in origin, the possibility of pocketed abscess is ever present, so that each case should be considered as a potential peritonitis, and emphasis should be placed on fluids forced by all routes except by mouth. Liquid diet may be given the day following the operation, and soft bland diet after the third day if there are no contraindications, and simple closure has been

made. The operative procedure employed will greatly influence the diet selected.

Drains if used are always removed entirely by the third day.

Anesthesia.—Two of the five cases reported were seen since we began the use of spinal anesthesia. In one of these, the fourth case, a low blood pressure and evidence of shock contraindicated its use. In the fifth case, spinal anesthesia 150 mgm. novocain was used with most satisfactory results. The other patients were operated upon under inhalation anesthesia.

Summary

A few cases are herein reported wherein quite definitely trauma was the causative factor in perforation of either the stomach or duodenum.

Perforations do occur where there have been no previous symptoms of any pathological condition existing at the site of the perforation.

Time is a most important element.

Operative procedures depend upon the individual case, and one should not be too zealous over any one method. All are good if the primary aim of saving the patient's life is accomplished.

THE LOCALIZATION OF BONES IN THE ESOPHAGUS BY ROENTGENOSCOPY*

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and

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Bones, especially those from fish, beef, and chicken, are frequently encountered as foreign bodies in the esophagus. Those from fish are usually straight and slender and, if they do not stick in the tonsil, base of the tongue, or hypopharynx, they pass into the stomach and are spontaneously expelled through the intestinal tract. Larger, irregularly-shaped pieces of bone, such as are found in the lutefisk, may become impacted in the esophagus and require esophagoscopy removal.

When beef or chicken bones are accidentally swallowed, they are of such size and shape that lodgment in the esophagus is a frequent occurrence, and unless they are removed promptly, they may produce a profound inflammatory reaction which results in perforation of the esophagus and in the development of a rapidly fatal mediastinitis. This inflammatory change is especially noted when meat is attached to the bone. Early recognition and removal of any foreign body in the esophagus is desirable, and, if the foreign body is a spicule of bone, delay in making a direct examination of the esophagus through an esophagoscope may subject the patient to unwarranted hazards.

Metallic foreign bodies in the esophagus are detected

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Fig. 1. Lateral view, revealing bone in upper portion of esophagus.



Fig. 2. Oblique view, faint shadow of bone is apparent in upper portion of esophagus.



Fig. 3. Anteroposterior view, the thinness of the bone prevented localization in this film.

with the greatest ease by roentgenologic examination; however, when the foreign body is a piece of bone, this method of examination may not furnish as much information. Fish bones are only rarely demonstrated by roentgen rays, and even large meat bones may fail to cast a sufficiently opaque shadow to permit their identification.



Fig. 4. Foreign body removed from esophagus.



Fig. 5. Sternum of chicken, showing flattened tip of lateral external process which is frequently encountered as a foreign body in the esophagus.

Many roentgenologists advocate the ingestion of small amounts of barium mixture in searching in the esophagus for foreign bodies that are not opaque to roentgen rays. This method may be of value to the roentgenologist, but when an esophagoscopy examination is carried out immediately afterward, the barium mixture may coat the esophagus to such an extent that the foreign body cannot be visualized. Unless an anteroposterior or lateral roentgenogram of the esophagus reveals a foreign body, further roentgenologic study should be deferred, in case the history suggests the presence of a foreign body, until an esophagoscopy examination has been made.

A foreign body in the esophagus should be suspected when dysphagia develops very suddenly or when there is a sensation of "something sticking in the throat," especially if the sensations occur while eating chicken salad, hashed or cream chicken, meat chops, or soup. Patients who swallow bones usually have complete dentures, or at least an upper plate, and ordinary sensation derived from the hard palate is absent. In the following case the chicken bone was of the type that is most often encountered in the esophagus. In this case it was clearly demonstrated in a lateral roentgenogram.

Report of Case

A woman, forty-nine years of age, had swallowed a piece of bone while eating creamed chicken with noodles, November 16, 1934. The following day, a roentgenogram had been taken at her home and a piece of bone was visualized on lateral exposure of the esophagus. Esophagoscopy had been performed, with the patient under general anesthesia, and a tiny fragment of bone had been removed. After this, the patient had felt quite comfortable. Subsequent roentgenologic studies revealed that the foreign body was still present, and she was sent to The Mayo Clinic for further treatment.

On her arrival at the clinic November 22, she was quite comfortable and said that the soreness in her throat incidental to esophagoscopy examination was gradually lessening and that she believed that the bone had been removed entirely from the esophagus. General examination gave negative results. The patient had complete artificial dentures.

On roentgenologic examination of the esophagus, a lateral view revealed a foreign body which was less

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noticeable in the oblique position and was not visible on anteroposterior exposure (Figs. 1, 2 and 3). From these findings it was suspected that a large, flat piece of bone was present in the upper portion of the esophagus.

On November 23, esophagoscopy was done under local anesthesia and the piece of bone (Fig. 4) was removed without difficulty. The patient returned home the following day.

The portion of bone ingested was the tip of the lateral external process of the sternum (Fig. 5).

MALIGNANT HYPERTENSION— SPLANCHNIC NERVE RESECTION*

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Mr. P. H., aged forty-four, presented himself to me in December, 1933.

Chief Complaint.—Severe, almost continuous, occipital headache.

Previous Medical History.—Entirely negative, except for a mild attack of influenza in 1920, and a tonsillectomy three years ago for chronic recurrent tonsillitis.

Family History.—Essentially negative. There is no history of cardiovascular disease in parents or other members of his family.

Present Trouble.—Patient stated that for past year he has suffered from almost continuous, severe occipital headache. Six months ago he consulted a physician, who found that he had a very high blood pressure, and prescribed some tablets for the purpose of reducing this pressure. However, this treatment procured no relief. He has tried all the different varieties of headache tablets, without result. He stopped his work and went to bed for two weeks, but the headache continued. During the past six months, he has been working intermittently, and during his work periods his efficiency has been greatly lowered. For the past month his condition has been much worse. Headache is exceedingly severe and is present all of the time, and there are episodes of vertigo and vomiting. He is unable to sleep, and is willing to do anything to get relief. There are no other symptoms.

Physical Examination.—The patient is large framed, weighing 186 pounds, but not obese. General condition good. Patient appears to be in pain.

Eyes: Pupils equal—react to light. Ocular movements normal. No nystagmus. No exophthalmos.

Mouth: Tonsils out. Teeth in good condition. Tongue coated and moist.

Neck: Thyroid is not enlarged. Moderate cervical adenitis.

Heart: Left border—apex impulse at the nipple line. Right border—normal to percussion. Heart sounds regular in rhythm. Normal in rate. There is a soft systolic murmur over the aortic area. Second aortic sound is loud and snapping.

Lungs: Negative throughout.

Abdomen: Soft, relaxed. No masses—no tenderness.

Extremities: Negative. No edema.

Peripheral Vessels: Only moderately sclerosed—not beaded—not tortuous. Sclerosis graded I. Blood pressure 200/130.

Rectal: Negative.

Neurologic: Essentially negative.

Ophthalmoscopic Examination.—Retinal vessels show moderate sclerosis and notching. No exudate. No hemorrhages. Same papilledema of both disks, especially on nasal side. Area of old choroiditis at the base of the right fundus.

Laboratory.—The urine on repeated examinations is negative, showing a specific gravity of 1.015, no sugar, no albumin, no casts, no pus cells. Blood chemistry normal. P. S. P. 70 per cent excretion in one hour. Hemoglobin 80. White blood count 8,600. Blood Wassermann negative.

Diagnosis.—On the basis of the patient's age, the acute nature of the disorder, and the beginning papilledema, diagnosis of malignant hypertension was made.

Treatment.—Some months ago, while I was visiting at the University of Michigan, Dr. Max Peet showed me a case of this type, in which he had accomplished resection of the splanchnic nerves, with an exceedingly good therapeutic effect.

Based upon this experience, it was determined to make a resection of the splanchnic nerves in this case. Accordingly, on December 13, 1933, under spinal anesthesia, the left greater and lesser splanchnic nerves were resected by Dr. A. E. Sohmer. The operation was terminated, it being the purpose to resect the right side at a later date.

For three days following this operation, the patient was in a condition of extreme cardiac collapse, during which time he was placed in an oxygen cabinet. On the fourth day his condition showed improvement, which continued, and he was discharged from the Hospital on December 23, ten days after operation.

Result.—The blood pressure was depressed during the operation, by reason of the spinal anesthesia, and remained so during his convalescence. The patient stated that immediately after operation his head felt clearer than it had at any time for the past six months. He has remained practically free of headache—has returned to his work, which is that of a foreman in a stone quarry. On June 30, six months after operation, his blood pressure was 165/100, and the eye-grounds were normal, except for evidence of very moderate arterial thickening.

On examination, August 13, 1934, the blood pressure was 130/100. There was no papilledema. Thus far we can see no reason to resect the nerves on the other side.

Comment.—Vascular hypertension is a vicious circle, producing as it does a chronic trauma to the arterial wall. This trauma results in stretching and injury with reparative fibrosis which equals arteriosclerosis. The more hypertension, the more arteriosclerosis, and the more arteriosclerosis, the more hypertension—thus completing the circle.

Malignant hypertension appears to be a separate entity, occurring in the earlier decades, and is perhaps of an infectious origin. Considerable evidence can be brought to bear to sustain this point. The subject of this report had a history of severe recurrent episodes of tonsillitis.

If, in a case of this type, the vascular bed, at some point, can be released from sympathetic control, the resultant vasodilation will mechanically reduce the vascular tension, thus breaking the circle. This must be done early in the disease, while the vessels still retain some resiliency.

This procedure has been accomplished in a few cases, including the subject of this report. It is yet too early to comment on the permanence of this result.

*From the Mankato Clinic. Presented at the annual meeting of the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1934.

EDITORIAL

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BUSINESS MANAGER

J. R. BRUCE, Saint Paul

Volume 18 APRIL, 1935 Number 4

Vitamin D Milk

The physician is frequently called upon to explain the value of vitamin D milk. Vitamin D milk is pasteurized, certified, or evaporated milk, with vitamin D added. This milk is extensively advertised to the public as a preventive of rickets and a safeguard to health, often leading to misunderstanding. This is inevitable since distributors of vitamin D milk are primarily interested in promoting sales.

There are three methods of increasing the vitamin D content of milk: yeast feeding, direct irradiation, and the addition of concentrates.

Certified milk is vitaminized by feeding irradiated dry yeast to the cattle. Every cow receives an average ration of 4.5 ounces of irradiated dry yeast daily. This process produces about 150 Steenbock units per quart of milk.

The direct irradiation method is employed most extensively in the vitaminization of evaporated milk. It is practical and economical in the treatment of large quantities of milk. The milk is flowed in a thin film subject to the direct exposure of rays from a carbon arc lamp, mercury vapor, or cold quartz lamp. This method produces about fifty Steenbock units per quart.

Pasteurized milk, which forms the principal

supply in the larger Minnesota cities, is fortified by the addition of cod liver oil concentrates. The cod liver oil is extracted with alcohol, the extract saponified and precipitated as calcium soaps, the D concentrate extracted therefrom with acetone. This is called the Zucher concentrate and is added to the milk at the time of pasteurization or bottling. Each quart of milk contains about 150 Steenbock units.

Obviously it would be unwise to permit the indiscriminate vitaminization of all foods. However if it be of value to provide additional vitamin D for the general population, particularly for children, milk should be the logical vehicle.

The housewife is sometimes misinformed that vitamin D milk is an adequate substitute for cod liver oil, which in addition to D vitamin contains A vitamin. Milk drivers are instructed to increase the sales of vitamin D milk and in their enthusiasm misinform the customer mothers that vitamin D milk is a complete substitute for cod liver oil. I believe we are agreed that milk lacks D vitamin, that it is desirable children have additional D vitamin, particularly in early life and during the winter months. Vitamin D milk contains enough D vitamin to be of antirachitic value and not sufficient to cause toxic effects even if given in addition to cod liver oil or one of its substitutes. If a child is given cod liver oil, haliver oil or tuniver oil under the directions of the doctor, there is certainly no need of giving vitamin D milk.

We may rationally advise: (1) that vitamin D milk is an excellent medium of giving additional vitamin D to the well child; (2) that it should not be depended upon as an absolute preventative or cure of rickets to the exclusion of cod liver oil, haliver oil, or tuniver oil; (3) that even if given in addition to cod liver oil the intake of vitamin D is not sufficient to produce toxic effects; (4) that vitamin D milk is not a complete substitute for cod liver oil, haliver or tuniver oil, and if a child is taking cod liver oil or one of its accepted substitutes there is no need of substituting vitamin D milk for ordinary milk.

F. G. HEDENSTROM.

May Day and Diphtheria Immunization

May Day, 1935, has been designated by the Committee of the State and Provincial Health Authorities of North America and also by the American Child Health Association, as the day of the year for concentration on the subject of diphtheria immunization.

While the designation of one day in the year to some specific cause which merits consideration every day in the year has been much overdone, the custom has publicity value. And publicity is of prime importance in disease prevention.

Universal vaccination against disease is very limited in application. The medical profession has been unanimous for years in its recommendation of universal smallpox vaccination. The results of diphtheria immunization have reached a point where its universal application should be heartily endorsed by the profession. Beyond this universal vaccination is not recommended.

A child six months or over is of suitable age for diphtheria immunization and because of the relative high mortality from the disease between the ages of six months and six years, inoculation at an early age is indicated. As pointed out in an editorial in our February number, the three inoculations with toxoid produce a higher percentage of negative Schick tests although the single dose of alum-precipitated toxoid is not without value. For routine immunization a repetition of the plain toxoid after a three weeks' interval is the best procedure.

Physicians through their advice to patients and their readiness to perform diphtheria immunization in children can cooperate with health officials in attempting to reach the goal of universal diphtheria immunization.

Clinic Criticized

According to Webster a clinic may be the instruction of a class by examination and treatment of patients or an institution connected with a medical school or hospital devoted to free treatment of patients. Webster does not authorize the use of the word clinic for a group of specialists associated in practice, common in the West.

In a recent article by Edna B. Mann* the unfortunate experiences of a patient who sought the services of a "clinic" or free dispensary are

related in detail. The long waits, delayed laboratory procedures, different doctors, lack of privacy and withal inefficient handling were all so galling that she borrowed some money and sought a private physician with highly satisfactory results.

The recital is doubtless an actual experience. Similar experiences could easily be found. It is equally true that some free clinics give highly satisfactory service, and all should not be condemned.

It is a fact that most free clinics are inclined to be overcrowded and undermanned. Some are forced to utilize an inexperienced medical personnel, and needless laboratory procedures and medication are likely to be in evidence.

In the set-up of a free clinic, just as in the panel system, individualization is handicapped. In such a clinic many patients are seen by a number of physicians and responsibility is easily divided. In the panel system the number of cases and not the quality of work is important.

The article referred to simply emphasizes the fact that the human being is a very complicated machine and demands individual medical care. No better boost for private practice could have been written.

Annals of Medical History

In the fall of 1917 shortly after our country entered the World War and at a seemingly most inopportune time, a group of courageous medical men launched a publication known as the *Annals of Medical History*. Its excuse was the growing interest in medical history and its pages were to be devoted to only high grade contributions to medical history. Those who have followed the appearance of the *Annals*, four numbers a year until 1929 and six a year since that time, under the able editorship of Francis R. Packard of Philadelphia, know how well the high aim of this journal has been reached. Each year's volume is a gem.

Now comes the disheartening news expressed in an editorial in the January issue of the *Annals* that "the *Annals* is faced with the unpleasant possibility that it may have to suspend publication" for financial reasons, and if so "it will be many a long year before a publisher will be found of sufficient courage and disinterestedness to undertake a similar project." Almost in a

*Mann, Edna B.: Cured by clinics. Abstracted from *Modern Monthly*, January, 1935, by *Readers' Digest*, March, 1935.

OF GENERAL INTEREST

Dr. A. W. Nuetzman, of Faribault, has become associated with the Central Clinic.

* * *

Dr. and Mrs. M. L. Mayland, of Faribault, are sojourning in Florida for several weeks.

* * *

Dr. D. W. Francis, formerly connected with the Faribault Clinic, has resumed his practice at Morristown, Minn.

* * *

Dr. F. M. Jolin of Coleraine and Dr. Ray Jolin of Lake Park have opened an office in Grand Rapids, Minnesota, where they have established a practice.

* * *

Dr. S. B. Haessley, of Faribault, who has been incapacitated for some months because of a fractured hip, is able to be at his office for a part of the time each day.

* * *

The Minneapolis Surgical Society elected officers for the ensuing year at the regular meeting held March 7, 1935. Dr. F. A. Olson was elected president; Dr. R. R. Cranmer, vice president; Dr. E. A. Regnier, secretary-treasurer. Dr. L. Haynes Fowler (five years), Dr. O. W. Yoerg (four years) and Dr. Kenneth Bulkley (three years) were elected to the Executive Council.

* * *

Dr. George von Anrep, Professor of Physiology at the University of Cairo, Egypt, will lecture on the subject "Recent Advances in the Physiology of the Heart and Coronary Arteries" at the Medical Science Amphitheater on the University of Minnesota campus, April 5 and 8, at 8 p.m. Dr. Anrep took part in the Physiology Symposium held on the campus in 1929 and is celebrated for his researches. He is a former student of Pavlov and Starling. Physicians and other interested in the subject will be welcomed.

Warning—Affiliated Underwriters Loan and Finance Company of Evanston

Our attention has been called to the activity of the above collection agency in Minnesota and Iowa. We are reliably informed that this agency has the same officers as the Birdsall Loan and Finance Company, also of Evanston, Illinois. Many complaints have been voiced by members of the medical profession regarding the methods used by this latter agency in collecting accounts and the character of the contract made with the physician, whereby professional accounts are assigned to the company and the commission for collection of the total amount of the accounts is kept by the agency before the physician receives anything. Those who may be interested further should refer to the *Journal of the American Medical Association* for March 31, 1934, under the Medical Economics section.

class by itself, the *Annals* carries no advertising and depends entirely on the subscription price of ten dollars a year for its maintenance. Subscriptions have fallen off and there is danger that this outstanding publication, born in troublous times and surviving the recent depressing five years, may not carry on.

We have been asked along with the editors of other state journals to lend our assistance to the *Annals* by calling attention to this unfortunate situation. We feel that we are rendering a service in calling the attention of those who do not know the *Annals* to this really remarkable example of what can be done in this country in the way of a medical publication. It is worth the subscription price, if one has the required ten dollars. If not, surely there are many groups of five or ten medical men in or outside of county medical societies who would be willing to get together to subscribe to this publication. It has been pointed out that ten additional subscriptions from each state will meet the situation.*

VIOSTEROL PREPARATIONS AND GALLSTONES

The widespread clinical administration of viosterol preparations has raised problems concerning several possible late effects and side actions. Among these questions is that of the formation of gallstones. Jones and Laing (*Am. J. Physiol.*, 110:471, (Dec. 1) 1934) have recently undertaken to ascertain whether the current use of viosterol preparations might lead to an increased output of calcium in the bile in dogs. One hundred and ninety-three analyses of bile calcium before the administration of a viosterol preparation were made and seventy-three after the daily administration of from 5 to 10 c.c. of viosterol in oil. From the results obtained by these investigators it was evident that doses of viosterol preparations considerably larger than would ordinarily be used in clinical practice do not raise the bile calcium concentration or modify bile output in the dog. Doses of viosterol preparations large enough to increase definitely the blood calcium level will increase the bile calcium concentration and decrease the output of bile. Jones and Laing hoped to obtain clinical confirmation on patients with chronic biliary fistulas but had not yet been able to do this. When and if confirmation is obtained, one more possible danger of viosterol administration will be eliminated.—*Journal A. M. A.*, February 23, 1935, p. 655.

*Subscriptions should be sent to Paul B. Hoeber, Inc., 76 Fifth Avenue, New York City.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.

W. F. Braasch, M. D., Chairman

J. C. Michael, M. D.

"No Jump in the Dark"

One of the most interesting little documents of recent years to the thoughtful American is called "Will America Copy Germany's Mistakes?"

It is written by Gustav Hartz, labor economist and publisher of Berlin, former member of the Reichstag and a competent witness to the failure in Germany of the very social experiments now contemplated in America.

When Germany took its first step fifty years ago toward its present elaborate system it was, indeed, as Dr. Hartz points out, a "jump in the dark." Nowhere did experience in the matter exist.

For America it is not a "jump in the dark." Americans have the benefit of fifty years' experience of Germany, the fruits of which are suggested by the following comments from the Hartz pamphlet. Incidentally the pamphlet is available through the Pennsylvania Self-Insurers' Association, Finance Building, Philadelphia, and also from the New York Medical Society.

Poverty Made Permanent

Says Dr. Hartz:

Social insurance is not only caused by lack of means but aggravates it and makes it permanent.

* * *

The inability to work out an accurate actuarial estimate of sickness and unemployment risks makes it difficult, if not impossible, to create adequate financial reserves. At best the benefits provided are too little to live on and too much for starving.

* * *

Sickness insurance has weakened the will to get well and malingering is common with the result that the number of sick days lost from work has multiplied five times, even though health in general has improved all over the civilized world.

Drugs Restricted

It is not to be wondered at if the level of medical care is low. The amounts paid for single services or single patients are so small that the physician is driven to mass practice and forced to subordinate quality to volume.

* * *

The popular demand for expensive medicines has brought about restriction of the use of drugs: doctors may not prescribe what they think best, but what the medical regulations permit.

* * *

An extensive supervisory system has completely destroyed the confidential relationship between practitioner and patient.

* * *

Says the *New York State Medical Journal* in an editorial comment on the Hartz analysis which is printed in full in the issue of March 1:

"Before our legislature votes to saddle the people with this incubus of compulsory health insurance—a burden that is more easily assumed than cast off—it should study Hartz's comprehensive analysis of the situation in Germany and consider whether precipitate action is necessary or justifiable."

Medical Pollyannas in California

At a recent meeting of the California State Medical Association's House of Delegates, the astonishing resolution printed below was adopted.

RESOLUTION NO. 2 INTRODUCED BY DR. IRVING S. INGBER AS AMENDED BY THE COMMITTEE

WHEREAS: The studies of the Committee of Five of the California Medical Association have shown the inability of a certain percentage of our population to adequately finance the cost entailed by illness; and

WHEREAS: Because of this economic situation proper medical care is beyond the reach of this population group; and

WHEREAS: It has been established that this problem

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can be alleviated by the utilization of the insurance principle;

NOW, THEREFORE, BE IT RESOLVED, That the House of Delegates of the California Medical Association recommends that legislation be proposed seeking to establish a health insurance system, mandatory as to certain population groups and voluntary as to certain population groups, which shall include the following principles: No. 1. The patient shall have absolutely free choice of physician and hospital; No. 2. The medical profession shall determine the scope, extent, standards, quality, compensation paid for, and all other matters and things related to, the medical and medical auxiliary services rendered under the system; No. 3. There shall be no provision for cash benefits; No. 4. The patient shall receive adequate treatment and his physician shall receive adequate compensation; No. 5. The foregoing principles shall be maintained with such modifications thereof as may from time to time be recommended, or approved by the profession;

AND BE IT FURTHER RESOLVED, That the California Medical Association immediately offer its full aid and coöperation to the Interim Committee of the Senate of the State of California charged with the study of this problem to the end that any measure which shall be passed establishing a health insurance system at the 1935 session of the California Legislature shall contain the above principles;

AND BE IT FURTHER RESOLVED, That there be formed a special committee authorized and empowered to act herein, constituted as follows: the Legislative Committee of the Association and three members of the Association to be appointed by the Speaker of the House.

It is difficult to understand how any group of medical men, with the present wide distribution of information on the economics of medicine, could have taken this action.

They have deliberately disregarded the experience of those unfortunate European countries that are struggling under the load of mandatory health insurance—as they have also disregarded the official disapproval by the House of Delegates of the American Medical Association of mandatory insurance in America.

"No Cash Benefits"

There shall be no cash benefits says this naive document. As though it had ever been possible or ever will be possible to divorce cash benefits from sickness insurance!

The experience of England has shown that cash benefits are inevitable—and also that the existence of these benefits is overwhelming the purely medical and preventive aspects of the system in spite of every effort to avoid it.

This California resolution also blithely prom-

ises that the patient shall have free choice of physician. It should be obvious to anyone that there can be no free choice under a mandatory system, operating through government bureaus, manned by government employees.

That medical practice could be controlled by medical men in competition with politics and political maneuvering is equally visionary.

It will require more than the expression of a pious wish, furthermore, for the patient under this politically controlled system to be certain of receiving "adequate treatment," or the physician adequate compensation.

The Poor Taxpayer

All this leaves out of account the overburdened tax payer who is already struggling under an impossible weight. He should be considered, too, before a new system of forced taxation for health insurance that will neither improve medical care nor extend its distribution is loaded upon him.

Members of the Minnesota State Medical Association are too well informed about the fundamental principles involved, we feel sure, ever to approve such a resolution in Minnesota.

County Officers Speaking

Two very important meetings from the standpoint of the social and economic progress of medicine in Minnesota were held in Saint Paul, February 23 and 24.

The first was the County Officers' Conference of the Minnesota State Medical Association; the second was the Northwest Medical Conference, now a nationally known conference, which has met each year since its organization by officers of the Minnesota association some eight years ago in St. Paul.

A lively interest on the part of the large number of officers and members who attended from all over the state marked the County Officers' Conference.

Relief, immunization campaigns, affiliate membership, state legislation, malpractice and the reports from Chicago of the delegates and Dr. R. G. Leland, director of the Bureau of Medical Economics of the American Medical Association, occupied the day-long session.

Below are some interesting excerpts from the

report of the session which has been sent from the state office to all secretaries and committee chairmen.

Relief

"The County Medical Advisory Committee has done more than any other one thing to keep relief work running smoothly. Only the very best men should be appointed to serve on Advisory Committees and these men should be kept on the committees once they are familiar with the work."

MR. GEORGE CROWNHART, Madison, Wis.
Secretary Wisconsin State Medical Society.

* * *

"One of our chief objects at this conference today has been to find out whether we are operating satisfactorily on our original basis for payment of medical relief fees. In that agreement only a few definite fees were set. They were supplemented by a general reduction of 40 per cent from normal fees.

We now have the testimony of county officers and Advisory and Contact Committeemen from many parts of the state who are present here today to the effect that things are working out very well over the state.

"That being the case, is there any necessity for a more detailed schedule of fees? It is the opinion of your Council, arrived at after more than fifty hours of study of the situation and conferences with SERA officials, that, under the circumstances, there is no need for us to commit ourselves further."

DR. H. Z. GIFFIN, Rochester
Chairman, Emergency Advisory Committee of the Council.

* * *

"Right now, many counties are short of funds for relief work. Only a certain amount of money is available from the federal government and eligibility for these funds is graded according to the amount of suffering due to drought, crop failure, et cetera.

"Keep track of your relief work and notify your relief worker. When funds are available you will be paid."

DR. H. M. JOHNSON, Dawson
Chairman, Public Policy and Legislation Committee

* * *

"The question of privilege is important in connection with medical relief work. Remember—you doctors have no authority to disclose the secrets of your patients—even when it is a question of supplying information for the audit of bills under provisions of Federal Bulletin No. 7.

"If it becomes necessary to disclose the general nature of the illness of your patient, get an authorization to do so signed by your patient and protect yourselves.

"You cannot jump off and leave a case, as you know. The law forbids it and relief officials should recognize

the law. That is why no one, not even the federal government, can tell you how many calls you can make on a patient. Congress has no authority over the practice of medicine in this state.

"The object of organized medicine, as I understand it, is to see, first of all, that those who need medical attention receive it; second, that lay people are not allowed to dictate to the doctor. The danger of that is perceivable to all. The government should set a high standard of medical ethics. In the maintenance of that standard the medical profession should exert all its rights."

MR. F. MANLEY BRIST, Saint Paul
Attorney, State Board of Medical Examiners

* * *

"So long as doctors can get money from their practice to live on we know that the poor will be cared for. What we don't know is: what will happen if the doctors can't make a living themselves? It looks to me as though the doctor had already done more than his share and it is time for the federal government to be a little more liberal in the matter of medical treatment for the people who are on relief."

MR. FOREST WHEELER, Saint Paul
SERA

Affiliate Membership

"There are seventy-two men in the State Association who have Affiliate Memberships and forty-seven more have passed the age of seventy and are still continuing to pay dues every year. If we change the age limit to sixty-five there will be an additional sixty-five members who are entitled to become affiliate members, the result in the reduction of income would be \$2,500 a year. Can we afford this reduction?"

DR. L. SOGGE, Windom
Councilor

* * *

"If we set the age limit at sixty-five everybody talks and thinks sixty-five. If we set the limit at seventy, the same is true. Why do we have an age limit? I suggest that we eliminate the age qualification and grant affiliate membership at the will of the Council to those who for some reason have ceased or partially ceased to practice, and that we have ethical conduct and high medical standards and a certain number of years of active membership as pre-requisites in each case."

DR. H. Z. GIFFIN, Rochester

* * *

"The problem in a large city differs somewhat from that in a rural community. It is inevitable that in cities like St. Paul, Minneapolis, Duluth, we find men, long established, whose income is diminishing though they have not ceased to practice. We would be glad to relieve those men."

DR. O. J. CAMPBELL, Minneapolis
Secretary, Hennepin County Medical Society

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Immunization

"We expect to have an immunization campaign in the spring based on the following plan:

1. All work to be done in the office of the doctor and a fee of \$1.00 to be charged (or \$1.50 if toxoid is not furnished free by the State Department of Health).
2. All paupers to get free service providing the SERA can find a way to provide toxoid and vaccine.
3. Children can be brought to the doctors' offices by groups in accordance with a set schedule."

DR. ARNOLD LARSEN, Detroit Lakes

* * *

"Our plan of procedure in this: A notice is sent home with each child and the parents indicate thereon their willingness to have the child immunized or vaccinated as the case may be. The teacher then makes out a data card on each case for our files.

"A charge of 75 cents was made previously for three inoculations of toxin anti-toxin; the charge at present is 50 cents for one inoculation of toxoid.

"Every physician is assigned a room and a helper and the child is sent to the physician designated by the parents.

"I believe this is a good way of doing the work. Inoculation in large groups in the office is likely to be a nuisance. Smallpox vaccination is different, of course, and takes more time."

DR. T. E. FLINN, Redwood Falls

* * *

"The Social Security Bill now before Congress asks for \$10,000,000 to be divided among the states for public health work. By the present arrangement this money will be distributed through the social service workers. This money will be available, probably, for immunization and vaccination on a large scale. Be sure, therefore, that you obtain a fee for what you do.

"Personally I do not believe in school house vaccination. I think the thing to do is to get the pupils to go to the doctors' office."

DR. H. M. JOHNSON, Dawson

Medical Economics for Students

"I have thought for a long time that our medical students receive very little training in the business aspects of the practice of medicine; in matters of economics, of investments, of relations with their fellow practitioners. The Alumni Association made a commendable effort to fill the need this year but attendance dwindled because the lectures were not compulsory. I have contacted the University in the hope that such a course can be made a part of the curriculum and subject to examination. It has been done with great success at Marquette University."

DR. W. A. COVENTRY, Duluth
President, Minnesota State
Medical Association

Health Insurance

"The Bureau of Medical Economics has studied the entire economic situation of medicine, considering more

than 150 plans for various types of medical service ranging from care of the indigent to complete medical service for all. It reiterates the fact that there is no model plan that can be regarded as a cure-all for social ills any more than there is a panacea for the physical ills that affect mankind.

"Your bureau is now ready, however, in accordance with the policy announced in the report of the Reference Committee at the special meeting in Chicago, to advise medical societies in the creation and operation of such plans locally.

"The medical profession is ready and willing to give the American people a complete medical service. I hope that organized medicine and the individuals of organized medicine will take advantage of the opportunities before us."

DR. R. G. LELAND, Chicago

Director, Bureau of Medical
Economics, American Medical
Association

* * *

"It was interesting to note the reaction of the House of Delegates to the New Deal. The bitterest opponent in the House was from the South. A year ago, the same representative hoped that social insurance and the New Deal would remove the burden of care of the negroes. He has found, since, that the negroes are the same burden as they were before."

DR. C. B. WRIGHT, Minneapolis
Trustee, American Medical
Association

* * *

"Here is a sentence I ran across in a recent popular magazine: 'Paper has never yet refused to receive printing and there comes a time when any plausible lunacy may have the momentary ecstasy of appearing in print.' That sentence applies excellently, I think, to the Epstein Bill."

MR. HARVEY T. SETHMAN
Executive Secretary, Colorado
State Medical Association

State Legislation

"The legislature as a whole is what we might deem conservative. There is a group in the House that refers to itself as a progressive group. But I don't think it wants legislation that is detrimental to the public health or the welfare of the medical profession. More than 1,500 bills have been introduced into the legislature so far this year.

"A bill requiring physicians to report gunshot wounds has attracted considerable attention. This bill proposed by the Crime Commission would require every physician, surgeon, nurse or hospital manager to report every wound made by a dangerous weapon.

"Other persons who might have knowledge of such wounds were not included in the provisions of the bill and neither was there any provision for keeping the information confidential.

"We opposed the bill for these reasons and because,

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carried to its logical conclusions, the bill involved several other absurdities.

"If a farmer should cut his foot with an axe, you, as physicians, would have to telephone the sheriff because the wound was made with a dangerous weapon. An automobile has been held to be a deadly weapon, so has a chair.

"Of course, the bill is the aftermath of the Dillinger case. Dr. Clayton May of Minneapolis was convicted in connection with that case, not because he treated Dillinger, but because he harbored a fugitive from justice."

MR. F. MANLEY BRIST, Saint Paul

Malpractice

"The best preventives against malpractice are: better treatment, better diagnosis, better records.

"The practical physician will protect himself by insurance and the wise one will take heed even if he is insured.

"Be frank with your patients. And always be just to your fellow practitioner.

"Keep up to date. The best way is to belong to your medical society. Arrange for post-graduate work through your own society."

DR. B. J. BRANTON, Willmar
Committee on Medical
Economics

Northwest Meeting

Approximately 100 officers committee chairmen, councilors from thirteen states attended the Northwest Medical Conference at the Lowry Hotel in Saint Paul, Sunday, February 24.

Included among the states represented were: Indiana, Michigan, Illinois, Wisconsin, Iowa, North and South Dakota, Montana, Colorado, Nebraska, Missouri, Kansas and Minnesota.

For the first time since organization of the conference by Minnesota Medical Association officials eight years ago, the next conference will be held outside of Saint Paul. It is slated for Chicago and Dr. Oliver J. Fay of Des Moines was elected 1936 president to succeed Dr. Philip H. Kreuscher, Chicago. Dr. E. S. Hamilton, Kankakee, Ill., was elected secretary to succeed Dr. R. L. Parker of Des Moines.

Following are abstracts from some of the important papers and discussions at this meeting:

Suggests "Partial Coverage"

DR. GORDON F. HARKNESS (Davenport, Iowa): Compulsory insurance, financially aided by the national or state governments, and thereby controlled by central bureaus, leads to excessive administrative cost, to say nothing of political influences.

Complete health insurance coverage in insurance com-

panies is high, not because the company is avaricious, but rather because their clients have been.

We are confronted with certain facts in this latter type of insurance: lack of actuarial figures, human avarice, lay and medical; the elimination of unnecessary calls for medical services; major illness costs which may not occur for several years; patient's choice of physician; maintenance of the patient's independence; elimination of small medical groups going into the sickness insurance business; maintenance of good medical service within a cost that can be met by the average individual.

In automobile insurance, partial coverage eliminates avarice. Why cannot partial coverage offer something in a practical way as far as sickness costs are concerned? Under normal conditions the ordinary wage earner can meet the expense of minor illness. It is when major illnesses with hospitalization confront him that he may be facing a financial catastrophe.

The kernel of the plan would be this: that before an individual could benefit from his insurance policy, he would have to present receipted bills for medical service up to a certain amount before becoming eligible for major benefits. If hospitalization were included, there would be the same curb. If such a plan is feasible, it demands local responsibility which should be assumed by local county medical organizations.

Medical Legislation

DR. F. S. CROCKETT (Lafayette, Ind.): Legislation emanating from the Congress at Washington has not been one of the problems of the medical profession until recently. The probability that the practice of medicine would be controlled through national legislation, such as sickness insurance, seemed quite remote. Nowadays we see that National legislation can also prove a disturbing influence in other ways than through sickness insurance. For example there are income tax rulings, registration fees as those imposed for the control of narcotics, the benefits given ex-service men in the form of free hospitalization, etc.

The threat of national legislation, inimical to the best interests of the medical profession and of scientific medicine, has developed with startling rapidity the last few months. Efforts made to learn the plans of those studying the medical phase of economic security for the Administration have been fruitless. Their attitude appears to justify the belief that they are not in harmony with our ideals, but, on the contrary, are quite determined to make us over to suit themselves.

The disposition on the part of certain department chiefs at Washington to interfere with and regulate and direct nearly everyone and everything seems to be increasingly more evident. The futility of formal protest has been affirmed. We should now make every effort to place before the appropriate committees of Congress and the individual members of both houses, the medical viewpoint.

We must remember that the A. M. A. and its constituent state societies and their component county societies were created and organized as scientific bodies.

MEDICAL ECONOMICS

Even now, in the midst of repeated and continued threats of socialization and legislation apparently designed to destroy many of the values which make the practice of medicine so desirable, many of our members are loath to desert the idea that we are devoted solely to scientific study. The more realistic of us, however, believe that recognition of conditions as they are and adoption of the corrective principle in harmony with practical experience does not necessarily mean getting into the gutter professionally. There are many proper and recognized ways by which a highly ethical profession can give the administration and congress the benefits of its judgments. We must make some concession to practicality and be prepared to make our influence manifest in the only way understood by those who represent us in Congress.

Local Legislation

DR. R. L. SENSENICH (South Bend, Ind.): The attitude of the individual legislator towards medical questions must obviously be the responsibility of the community from which he comes. Most definitely this responsibility rests upon the local medical society, and more specifically still upon a medical man designated by that society, someone who knows the legislator best, who has his confidence. The Legislative Committee of the American Medical Association is now in the third phase of its so-called contact plan of organization to oppose sickness insurance legislation through direct approach to the lay public. Conferences with political, religious, industrial, Legion and other major groups have been held, and those in high government positions. The present phase is, therefore, to contact the individual citizen in his home through the family doctor. No physician in private practice would remain uninfluenced in his practice or economic situation if sickness insurance were established.

Over-Production of Physicians

DR. F. J. SAVAGE (Saint Paul, Minn.): While we have less than half as many medical schools as were in existence 25 or 30 years ago, the annual number of graduates is nearly as large as at the peak of the production when there were twice as many schools.

With the benefit of modern transportation facilities, with a widespread system of telephonic communication and with a tremendously larger number of hospitals than were in existence some years ago, the individual physician is able to cover a much greater territory than formerly and is therefore able to give competent service to a much larger group of patients.

There has been a tremendous reduction, also, in the incidence of certain diseases which formerly engaged a very large part of the time and effort of physicians. The improvement in diagnostic methods, too, has operated to decrease the amount of time physicians are required to give certain patients.

Since the medical schools appear to be making no concerted effort to turn out fewer physicians, the responsibility is squarely on the shoulders of the medical profession. With 3,000 deaths per year among physicians and over 5,000 graduates, and the population rapidly approaching a stationary point, in 20 to 30 years, if they are unchecked in the interval, the economic status of physicians will be in jeopardy. Widespread information among physicians along these lines is imperative.

DR. B. F. BAILEY (Lincoln, Nebr.): I fear we are getting on dangerous ground. Can you tell me of any profession that is not overcrowded? We are born independent with ability to do what we can by education and I do not know what we are going to do with these boys. The present, at least, seems to be the wrong time to act. These boys have no employment. I do not know of any way we can control this. Where will they go?

What is "Adequate Care"?

DR. R. G. LELAND (Chicago, Ill.): When we speak of the over-production and under-production of medical facilities and particularly physicians, we are bringing into consideration certain factors which need very careful consideration.

What is adequate medical care? As far as I know that question has never been answered or at least not to the satisfaction of some of us, although the Committee on the Cost of Medical Care published one volume on the subject.

If we are able to arrive at an answer, the next question is: How much more medical care is needed? At the present time there is absolutely no way in which you can get a fairly complete picture of the amount of morbidity which needs to be cared for by the medical profession in the United States and until you have answered these two questions, you cannot answer the question as to how many physicians are needed to take care of that morbidity.

Time Lag

There is still another problem to solve. In the practice of medicine a greater time elapses between the time the person decides to become a doctor and the time he begins to practice medicine than in any other vocation. Put yourself in the place of the young man or woman who, in 1924 or 1925 decided to become a physician. The lag between that time and the time he is permitted to practice medicine, takes him into the depression.

Another fact we must face is whether the tax supported institutions which have medical schools can legally refuse applicants for entrance because of the fact that their parents and families are paying taxes. The question of limitation in private schools might be more easily solved.

The Council Meets

Medicine in State Institutions

Appointment of a committee to make a survey of the quality and extent of medical care in state institutions was suggested by Dr. W. R. Humphrey who made his suggestion in person at the invitation of the Council.

Such a check by responsible physicians will prevent the possibility of unpleasant medical scandals, Dr. Humphrey told the Council.

By a coincidence, the Committee on State Health Relations, Dr. Theodore Sweetser, chairman, has just undertaken a similar survey as part of its 1935 program.

The Council upon being informed of this project, officially approved of the survey, thanked Dr. Humphrey.

Minnesota State Meeting

Members of the Council were informed of the 1935 program policy: all speakers with one possible exception are to be out-of-state men.

Minnesota men will figure prominently in the scientific exhibits and demonstrations—the latter will occupy two hours of program time daily, from 10 to 11 a. m. and from 2 to 3 p. m.

Fifteen distinguished guest speakers have definitely accepted invitations to speak (see program account elsewhere in this issue).

Hobby Show

What do doctors do in their hours of leisure?

Some of them lay aside their detective fiction for the wood carver's knife, for paint and plaster, or the camera or the collection of books, fire-arms or pipes.

An exhibit of these hobbies of Minnesota physicians will be one of the high lights of the 82nd Annual Meeting the Council was told.

Funds raised from sale of exhibit space to commercial firms that supply materials needed in the pursuit of these hobbies can be used to provide an adequate space for treasures and trophies, the Council decided, and proper guards during the three days of the meeting.

Renominated

For the Certification Board for Public Health Nurses the Council renominated Dr. O. E. Locken of Crookston.

Maternal Welfare

A new Committee on Maternal Welfare will be appointed for the State Association, with the approval of the Council. Dr. R. D. Mussey of Rochester will be chairman of the new committee according to President W. A. Coventry of Duluth who was empowered by the Council to appoint the committee. There will be four other members, one each from Minneapolis, Saint Paul and Duluth and one from the rural counties.

Course for Seniors

The proposal of Dr. Coventry that senior medical students receive a compulsory course in medical economics, medical ethics and their legal status and rights was approved by the Council. Dr. Coventry reported that he is now in correspondence with the Dean on the subject.

Such a course was recommended to take the place of a proposed letter to graduating students.

Immunization

The Council cannot lay down any rules regarding immunization campaigns—how they are to be carried out and where, the price to be charged, et cetera. Each county society must decide upon its own policy and make its own rules since the number of physicians participating, the distances, the funds and the ability of the people to pay differ in each community.

Minnesota State Board of Medical Examiners

Out of State Doctor Warned Against Practicing Medicine and Healing

On February 22, 1935, the Minnesota State Board of Medical Examiners issued a warning to Dr. F. C. Vogt, 159 North State Street, Chicago, Illinois, to cease practicing healing in the State of Minnesota without a license.

Dr. Vogt is licensed to practice medicine in the State of Illinois, but has no license in this state. He was conducting a so-called postgraduate class in hernia at the Curtis Hotel in Minneapolis for a so-called tuition fee of ten dollars per doctor. About forty doctors were in attendance from Minnesota, North Dakota and Wisconsin. Persons were treated for hernia and there is no provision in the Medical Act nor the Basic Science Law that excepts Dr. Vogt. Dr. Vogt was not called in consultation by any doctor in this state, nor is he a member of the teaching personnel of the University of Minnesota.

The records in the possession of the Minnesota State Board of Medical Examiners indicate that Dr. Vogt was born in 1881 and holds a diploma from the St. Louis University School of Medicine in 1906. He is

not a member of the Chicago Medical Society nor the American Medical Association. Dr. Vogt apparently located in 1928 from Gillespie, Illinois. He was associated with an advertising varicose vein treatment concern known as the Viscose Ambulatorium. In February, 1931, he was associated with the Illinois Intravenous Institute. In May, 1931, he was associated with the Vartex Company in a varicose vein treatment. Dr. Vogt is now connected with the Loop Health Center, 459 North State Street, Chicago, Illinois.

Dr. Vogt was informed that if he continued to operate in the State of Minnesota a prosecution would be instituted and the case would be tried out in Court. At first he stated he was called in consultation, but when this was refuted he stated he was merely giving lectures, but finally admitted that people had been injected for hernia. He further stated that rather than have any trouble about the matter he would leave the State at once.

St. Paul Physician's License Revoked For Narcotic Violation

In the Matter of the Revocation of the License of James O. Cavanaugh, M.D.

The license to practice medicine held by Dr. James O. Cavanaugh was revoked on February 9, 1935, by the State Board of Medical Examiners. Dr. Cavanaugh entered a plea of guilty on November 26, 1934, to an indictment charging him with violation of the Harrison Narcotic Law. It was shown that Dr. Cavanaugh had written numerous prescriptions for drug addicts. Following Dr. Cavanaugh's conviction a petition was filed in the Probate Court of Ramsey County to determine whether or not Dr. Cavanaugh was a dangerously insane person. After an examination by two Saint Paul psychiatrists Dr. Cavanaugh was found sane and the petition was dismissed. Dr. Cavanaugh is serving a sentence of a year and a day at the Federal Penitentiary at Leavenworth, Kansas.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners Feb. 9, 1935

January Examination

By Examination

Alcorn, Kent Achibald, U. of Ill., M.D., 1931, Rochester, Minn.
Arling, Leonard S., U. of Minn., M.B., 1934, Minneapolis, Minn.
Army, Frederick Phillip, U. of Minn., M.B., 1934, Saint Paul, Minn.
Baird, Lester White, U. of Ill., M.D., 1933, Rochester, Minn.
Barr, Lowell Colvin, U. of Neb., M.D., 1933, Albert Lea, Minn.
Becker, Frederic T., U. of Minn., M.B., 1934, Minneapolis, Minn.
Bedard, Robert Edward, U. of Ill., M.D., 1934, Rochester, Minn.
Butt, Hugh Roland, U. of Va., M.D., 1933, Rochester, Minn.
Coffey, Robert James, Georgetown U., M.D., 1932, Rochester, Minn.
Dietrich, Frank Sigel, Stanford U., M.D., 1934, Rochester, Minn.
Dry, Thomas Jan, U. of Cape Town, Africa, M.B.-Ch.B., 1929, Rochester, Minn.

April, 1935

Foker, Leslie Warren, U. of Minn., M.B., 1933; M.D., 1934; Minneapolis, Minn.
Foster, Frank Pray, McGill U., M.D., 1933, Rochester, Minn.
Freidman, Louis Lawrence, U. of Minn., M.B., 1932; M.D., 1933; Minneapolis, Minn.
Giere, Carl Norman, U. of Minn., M.B., 1934, St. Paul, Minn.
Gunlaugson, Frederick Gunnar, U. of Minn., M.B., 1934, St. Paul, Minn.
Heise, Herbert von Rohr, Jefferson Med. Col., M.D., 1927, Winona, Minn.
Hertzog, Ambrose John, Tulane U., M.D., 1932, Rochester, Minn.
Hutchinson, James Carl, Northwestern U., M.B. and M.D., 1933, Rochester, Minn.
Johnson, Emil Waldemar, U. of Minn., M.B., 1934, Duluth, Minn.
Johnson, Paul Ames, U. of Minn., M.B., 1934, St. Paul, Minn.
Jones, Herbert Maltby, Cornell U., M.D., 1932, Rochester, Minn.
Kaump, Donald Hunter, Washington U., M.D., 1932, Rochester, Minn.
Lundquist, Curt Wallace, U. of Minn., M.B., 1934, Minneapolis, Minn.
McClatchey, Warren Samuel, U. of Neb., M.D., 1933, Red Wing, Minn.
McTamaney, Robt. Anthony, Georgetown U., M.D., 1932, Rochester, Minn.
Mithy, Irvin LeRoy, U. of Minn., M.B., 1934, St. Paul, Minn.
Moberg, Clarence William Rush, Med. Col., M.D., 1934, Minneapolis, Minn.
Nydahl, Malvin John, U. of Minn., M.B., 1934, Minneapolis, Minn.
O'Neal, Buford Lee, Vanderbilt U., M.D., 1932, Rochester, Minn.
Platou, Ralph Victor, U. of Minn., M.B., 1933, Minneapolis, Minn.
Ritchey, Sterling James, U. of Iowa, M.D., 1932, Minneapolis, Minn.
Roemer, Henry Joseph, U. of Minn., M.B., 1934, St. Paul, Minn.
Rogers, Charles Wesley, U. of Minn., M.B., 1934, Duluth, Minn.
Sanford, Hawley Seager, Harvard U., M.D., 1933, Rochester, Minn.
Schade, Frederick Louis, U. of Minn., M.B., 1934, Minneapolis, Minn.
Searles, Paul Wesley, U. of Minn., M.B., 1933; M.D., 1934; Rochester, Minn.
Shoemaker, Rosemary, U. of Pa., M.D., 1933, Rochester, Minn.
Thielen, Robert Dexter, U. of Minn., M.B., 1934, St. Paul, Minn.
Turnbull, Andrew, U. of Manitoba, M.D., 1929, Rochester, Minn.
Walch, Alphonse Edmund, St. Louis U., M.D., 1933, Minneapolis, Minn.

By Reciprocity

Macey, Harry Buford, U. of Tenn., M.D., 1930, Rochester, Minn.

National Board Credentials

Fritzell, Kenneth Edward, U. of Minn., M.B., 1930; M.D., 1931, Minneapolis, Minn.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for April

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

- April 2—Hand Infections.
- April 9—Leukemia.
- April 16—Ear Infections.
- April 23—Hysteria.
- April 30—Prenatal Dental Care.

American Association on Mental Deficiency

The annual meeting of the American Association on Mental Deficiency will be held at the Hotel Palmer, Chicago, on April 25, 26, and 27. The Thursday and Friday sessions will be devoted to studies on Mongolism; Birth Injury as an Etiological Factor in Mental Deficiency; Mental Disorders in Mental Deficiency; The Problem of Sterilization; Defective Delinquency and its Relation to Penal Institutions; Community Supervision of the Paroled Mental Defective; and Newer Methods in Institutional Training for Community Life. The Saturday session, on April 27, will be devoted to the sociological, psychological, and the special educational aspects of Mental Deficiency. Physicians are cordially invited to attend these sessions. Complete data on the program may be obtained from the Secretary, Dr. Groves B. Smith, Godfrey, Illinois.

State Association Meeting

With the acceptance of Dr. L. W. Sauer of Chicago to speak at the annual meeting of the Minnesota State Medical Association to be held June 24, 25 and 26 at the Minneapolis Auditorium, arrangements for the Tuesday morning program have been virtually completed.

This meeting will be one of the two joint sessions to be held with the American Association for the Advancement of Science, which will meet during the same week at the University of Minnesota. Dr. Sauer, who will come here under the auspices of the Northwest Pediatrics Society, will give the principal address from 11 to 12 o'clock on this program. He will talk on "Whooping Cough Vaccine."

The hours from 8 to 10 will be devoted to a symposium on blood diseases with three noted physicians of the United States taking part. Dr. William P.

Murphy of Harvard Medical School will speak on "Liver Therapy in the Treatment of Anemia"; Dr. T. L. Squier of Milwaukee will talk on "Agranulocytosis," and Dr. W. A. Bloedorn of the United States Public Health Service, Washington, D. C., will discuss "Iron Therapy."

Dr. Murphy with Dr. George Minot, also of Harvard, and Dr. George H. Whipple of the University of Rochester, received the 1934 Nobel Award in Medicine for their work on Liver Therapy in Anemia. Dr. Murphy's appearance on the program will be sponsored by the Hennepin County Medical Society. Drs. Bloedorn and Squier were invited to speak by the American Association for the Advancement of Science.

Dr. Murphy will give a popular address on the Monday night program which will be the other joint session of the two associations. A number of other distinguished medical men are among the speakers for three-day session including Dr. Frank Lahey of Boston, sponsored by the Minneapolis Surgical Society; Dr. Percy Brown of Boston, who will give the Russell D. Carman Memorial lecture; Dr. Harry Alexander, St. Louis; Dr. Edmund Andrews, Chicago, and Dr. Thomas G. Orr of Kansas City. Dr. Richard Pearson Strong, Professor of Tropical Medicine at Harvard, will appear as the guest speaker of the American Association for the Advancement of Science.

Scientific demonstrations and exhibits will play a more important part in this year's meeting than ever before. Definite periods each day will be especially devoted to this section of the program. Two clinics will also be included on the program, one to be conducted by doctors of the Mayo Clinic, Rochester, the other by University of Minnesota physicians.

Hobby Show

A feature of the 1935 meeting is to be a hobby show to include a wide range of exhibits representing the activities of the doctors in their moments of recreation away from their profession.

Hobbies which take the form of art such as painting, sculpturing, photography, wood carving, writing (not medical papers but in a lighter vein), music, gardening, landscaping, even architecture will be included. The sports will be represented: hunting, fishing, riding, golfing, boating, play of any sort.

In addition there will be the collections of various articles, pipes, firearms, trout flies, coins and stamps, antiques and other objects dear to the hearts of men whatever their profession. As a special attraction the Ramsey County Medical Society will be asked to provide an historic medical exhibit.

A special room in the Auditorium, where the entire meeting program will be held, will be devoted to the hobby show, in order that prized collections may be locked up and guarded.

Anyone interested in exhibiting his own particular hobby is urged to communicate with Dr. F. A. Olson of Minneapolis, chairman of exhibits for the Hennepin County Medical Association.

A Course in the Allergic Diseases

A course in the *Allergic Diseases, their Prevention, Diagnosis and Treatment*, offered by the General Extension Division, University of Minnesota, will be taught by Dr. R. V. Ellis of the University of Minnesota Health Service, starting Tuesday, April 2, 1935, at 7:30 p. m. and continuing thereafter for eight weeks. Meetings will be held in room 12 of the Medical Science Building, University Campus. The registration fee of \$5.00 should be sent to 402 Administration Building, University Campus, Minneapolis.

Minnesota Dermatological Society

The Minnesota Dermatological Society announces the second annual Vander Horck lecture and clinic. The guest of honor this year will be Professor Franz Blumenthal of Ann Arbor, formerly of Berlin, who will lecture before the University Hospital staff at 12:30 on Thursday, April 18. The subject will be the *Paradoxical Influence on the Sun's Rays on Cancer, Causative and Curative.* All physicians are invited to attend the lecture.

The Vander Horck meetings were begun last year in commemoration of Dr. Max Vander Horck.

Minneapolis Surgical Society

The annual symposium on cancer of the Minneapolis Surgical Society will be held in the Hennepin County Medical Society Auditorium, Thursday, April 4, 1935, at 8:00 p. m.

- I. Dr. Martin Nordland, President
Announcements and Introduction of Cancer Committee Chairman
- II. Dr. Kenneth Bulkley, Chairman
Introductory Remarks
- III. Dr. S. H. Baxter
Melanoma.
- IV. Dr. Martin Nordland
Malignancy of the Thyroid.
Discussion by Dr. C. R. Drake (by invitation).
- V. Dr. F. A. Olson
Organization of Hospital Service for Diagnosis and Treatment of Cancer.
- VI. Dr. Theodore Sweetser
Malignancy of the Urinary Tract.
- VII. Dr. S. R. Maxeiner
Carcinoma of the Stomach.
- VIII. Dr. J. A. Johnson
Treatment of Carcinoma of the Rectum by Cautery in Patients of Advanced Age, and Otherwise Poor Surgical Risks.
F. A. OLSON, M.D., *Secretary*

Kandiyohi-Swift-Meeker Counties

The March meeting of the Kandiyohi-Swift-Meeker County Medical Society was held March 14 at the Lakeland hotel, Willmar. A discussion of the proceedings of the annual county officers' meeting held in Saint Paul in February was given by the president of the society, Dr. F. W. Behmler, and a number of members who attended the conference.

Rice County

A meeting of the Rice County Medical Society was held in the Faribault Clinic Rooms, Thursday, 7:45 p.m., March 21.

Drs. E. C. Kendall and A. M. Snell, of the Mayo Clinic, spoke on "Endocrine Glands." These gentlemen should be complimented for their wonderful and interesting talk on this subject.

The following resolution was unanimously adopted:

WHEREAS, It is fitting and proper that outstanding work in any branch of medicine should be appreciated and honored by fellow scientists; and

WHEREAS, Dr. Adolph M. Hanson, one of the members of the Rice County Medical Society, has for the last ten years done such outstanding work in laboratory investigations, covering the parathyroid, thymus and pineal glands, which work has been highly honored in eastern and western research laboratories;

THEREFORE BE IT RESOLVED, That the Rice County Medical Society wishes to express its appreciation of Dr. Hanson's scientific work and to assure him that the society feels itself honored to number him among its members.

BE IT FURTHER RESOLVED, That these resolutions be spread on the minutes of the society.

C. J. PLONSKE, *Secretary.*

Stearns-Benton Counties

The relief director was the main speaker of the evening at the meeting of the Stearns-Benton Medical Society at the Breen hotel in St. Cloud, March 28. "Federal Relief" was the subject discussed by Director Whitmore. Dr. R. N. Jones presented a case and movies were shown on "Repair of Urethrocele, Cystocele and Lacerations of Cervix" and "Repair of Second and Third Degree Lacerations of the Perineum and Rectocele."

Wabasha and Winona Counties

There were thirty-four in attendance at the annual dinner and joint meeting of the Wabasha and Winona County Medical Societies held at Buena Vista Sanatorium, Wabasha, on the evening of March 18.

The following program was presented:

Hemorrhage Rubella: Case Report, Dr. D. P. Dempsey, Kellogg.

Pupillary Phenomena, Dr. E. D. Risser, Winona.

Coronary Sclerosis: Diagnosis, Prognosis and Treatment, Dr. A. R. Barnes, Rochester.

Uses of the X-Ray in the Diagnosis of Lesions in the Large Intestine, Dr. H. M. Weber, Rochester.

Our Relations to Present and Proposed Economic Regulations, Dr. W. A. Coventry, Duluth, president of the State Medical Association.

At a special session of the Wabasha County Medical Society held in connection with the above meeting, Dr. Bernard A. Flesche of Lake City and Dr. Hubert T. Sherman of Plainview were elected to membership. The invitation of Dr. R. C. Radabaugh of Hastings, president of the Wabasha County Medical Society, to meet as his guests at Frontenac Inn for the annual meeting in July, was accepted.

PROCEEDINGS of the MINNESOTA ACADEMY OF MEDICINE

Meeting of February 13, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, February 13, 1935. The President, Dr. Alexander Hall, in the Chair.

The meeting was called to order at 8 p. m. There were 50 members and 2 guests present.

Minutes of the January meeting were read and approved.

The scientific program was as follows.

OLEOTHORAX: A REPORT OF ITS USE IN TWENTY CASES

EVERETT K. GEER, M.D.

Saint Paul

(To appear later in MINNESOTA MEDICINE)

Discussion

DR. F. F. CALLAHAN (Pokegama): I think Dr. Geer has covered the subject of oleothorax very well. The field for this type of treatment is limited and cases must be carefully selected. It should never be given as a primary measure and at least a partial pneumothorax should be present before oil is introduced into the pleural cavity. We have found it valuable in tuberculous pyopneumothorax in the absence of bronchial fistula or when the fistula is small. It is useless or even harmful when a patent broncho-pleural fistula exists. It often closes cavities, stops the expectoration of positive sputum and causes a loss of symptoms of active tuberculosis in cases that cannot be controlled by pneumothorax. Oleothorax frequently obviates the necessity for major chest surgery temporarily and in some cases permanently.

Our first apparently successful case of oleothorax at Pokegama was in a man twenty-five years of age, who was found to have far advanced bilateral tuberculosis in October, 1929. He had rest treatment plus pneumothorax for nineteen months in a sanatorium. Following partial pneumothorax collapse of the left lung he developed a severe left-sided pyopneumothorax. When he came under our care he was very toxic and weighed 109 pounds. His height was six feet. He had, in addition, roentgenological evidence of infiltration and a medium sized cavity in the upper portion of the right upper lobe, a tuberculous lesion in the cecum and a tuberculous ulceration in the interarytenoid space of the larynx. Oleothorax was started in July, 1931. The pus in the left pleural cavity was aspirated and the pleural pocket was washed with normal saline solution. The air was replaced with one per cent gomenol in mineral oil. In two months the pus disappeared from the pleural cavity and all symptoms abated. He was discharged from the sanatorium in March, 1933. His sputum had been negative for one year and his weight was 139 pounds. During the past summer he indulged in fairly strenuous exercise, including swimming and diving. This was against advice. In October, 1934, he developed

a tuberculous abscess in the distal end of the ninth rib on the left side, which broke down and formed a fistula. He lost a moderate amount of oil and for the first time in two and a half years he began to raise positive sputum. At the present time his fistula is practically healed, he is holding his oil and the sputum is greatly reduced.

In February, 1932, we admitted a seventeen year old girl with an advanced tuberculosis in the left lung, with cavity formation and a moderately severe diabetes. A partial collapse of the left lung was obtained by pneumothorax. This controlled her expectoration and other symptoms for a short time. Oleothorax was done outside the sanatorium, but was unsuccessful. She was readmitted in November, 1933, the oil was aspirated and a phrenicectomy was done December 2, 1933. A thoracic coplasty was contemplated but it was decided to give oleothorax another chance. She left the sanatorium September 29, 1934, and informed me a short time ago that she had not raised sputum since the first week in September, 1934.

Both of these cases may come to major surgery later and, if so, their chances of surviving will be much greater than when they were first seen.

At a recent meeting of the Minnesota Trudeau Society, Dr. A. J. Chesley stated that the death rate from tuberculosis in Minnesota had dropped from 119 plus in 1911 to 38 plus in 1933.

Collapse therapy has undoubtedly played a considerable part in this reduction in the death rate. In addition to the lives directly saved, collapse therapy has diminished materially the incidence of infection. Now many patients return to their homes free from tubercle bacilli who formerly would have been positive as long as they lived. Collapse therapy is cutting down the number of chronic carriers. While oleothorax must play a minor role in collapse therapy it is of great value in many cases.

DR. S. E. SWEITZER (Minneapolis): I did not understand what kind of oil Dr. Geer uses in these cases, whether it is a mineral oil or vegetable oil. The tissue reactions are different in the two; mineral oil is more likely to give an irritating reaction.

DR. JOHN F. NOBLE (Saint Paul): At some time in the future, Dr. Geer and I hope to be able, from experimental data, to answer some of the questions which he has raised regarding oleothorax. At the present time, we have only a small amount of experimental material. In the spring of 1933 we produced an oleothorax in four rabbits using plain paraffin oil in two, paraffin oil with 2 per cent gomenol in one, and paraffin oil plus an oil soluble dye in another. Two of the animals were studied after about a three-week interval while two were allowed to go for over a year. It was interesting to note that at first the inflammatory cellular reaction was acute in type, though even after only a few weeks high grades of fibrosis were seen in the

pleural cavities. The cell reaction in these cases consisted of polymorphonuclear leukocytes, plasma cells, and lymphocytes. In the cases allowed to go longer periods, a peculiar picture was seen. In one animal the entire pleural cavity was replaced by a mass of material resembling adult fat tissue with a large amount of connective tissue stroma. Microscopic sections of this tissue showed large globules of the oil to be surrounded by connective tissue bands. The spaces were lined by macrophages which, in some instances, were markedly flattened. At other points the macrophages had definitely phagocytosed small oil globules.

In producing unilateral oleothorax in a rabbit, the oil may leak to the other pleural cavity since the mediastinum is not complete in a rabbit. In one instance where this happened, the lung on the side opposite to the original oleothorax showed, in its parenchyma, a picture similar to that described in aspiration lipid pneumonia. The alveoli showed numerous giant cells containing phagocytosed oil globules and some of the small arteries were filled with fat. The endothelium of the arteries containing oil was proliferating. We are not ready to offer an explanation of this finding, but it opens an attractive field for investigation.

Dr. Geer and I are going to continue these animal experiments and in the future we may be able to explain more fully some of the questions he has raised.

DR. IRVINE MCQUARRIE (University of Minnesota): We have made some studies of the blood lipids in epileptic patients because of the fat-like nature of the brain itself. We found incidentally that patients who developed pneumonia and certain other febrile diseases during the course of our study had very markedly reduced plasma cholesterol, lecithin and total fatty acids. We extended the investigation to a variety of infections and found that so long as the patient had a fever the lipids remained low and that with convalescence they returned to higher levels. Patients who finally expired would have persistently low blood lipids. Dr. Stoesser has continued the work and found that the unsaturated fatty acids of the blood are diminished. I wondered, when one administers these oils intrapleurally, if one is not getting something in addition to the mechanical factor by the absorption of the oil. The fat metabolism is tied up very closely with the processes of immunity; and tuberculosis was one of the first diseases in which the plasma cholesterol was found to be very low.

DR. F. R. WRIGHT (Minneapolis): I wonder whether a man is justified in using experimental therapy on the human being. These cases, I understand, are practically all fatal if left to the ordinary methods of treatment; therefore, one would feel he is justified in trying almost anything. Within the last six months a patient has said to me, "I can replace my money, but life cannot be replaced."

DR. GEER (in closing): In reply to Dr. Sweitzer's question, I have been using 2 per cent gomenolized paraffin oil for the tuberculous empyema cases. For inhibitory and compression purposes, plain paraffin oil has been used. Although it has been thought from clinical observations that paraffin oil is more irritating

to the pleura than olive oil, the experimental notations by Goldenberg and Flanchik point to the opposite conclusion.

I would like to stress most emphatically that this measure along with our other collapse therapy procedures in no sense approaches a panacea for the treatment of pulmonary tuberculosis and its thoracic complications. Oleothorax is to be looked upon as another aid and quite limited in its scope, but definitely helpful when indicated.

THE EFFECTS OF SODIUM AND POTASSIUM SALTS ON CARBOHYDRATE METABOLISM AND BLOOD PRESSURE

IRVINE MCQUARRIE, M.D.

Minneapolis

Abstract

In the course of a preliminary inquiry concerning the cause of the excessive craving for salt which was manifested by one of our severely diabetic boys, it was incidentally discovered that he developed arterial hypertension during periods of high sodium chloride intake. Further study revealed the additional fact that the degree of glycosuria was diminished during such periods. It was, therefore, determined to make a careful investigation of these phenomena under more thoroughly controlled conditions. During the past year Dr. Thompson and I have made repeated observations on four diabetic children and on one non-diabetic control subject with similar results.

Briefly, it has been found in diabetic patients on uniform maintenance diets low in potassium and with insulin dosage adjusted at such a level as to permit a moderate degree of glycosuria throughout the day, that ingestion of from 30 to 80 grams of NaCl daily results in a significant decrease in glucose output (*e.g.*, from 60 to 20 grams daily) and an elevation of both the systolic and diastolic blood pressure. Other sodium salts than the chloride, namely bicarbonate of citrate, have similar but less striking effects. Potassium chloride was found to influence the blood pressure and the carbohydrate metabolism in the reverse direction, causing an increase in the degree of glycosuria and a decrease in blood pressure. Calcium and magnesium salts are also being studied.

The mechanism of these relationships is not as yet understood. That the effect of the NaCl on glucose output is not merely one of retention of glucose along with retained water is shown by the fact that the latter rarely exceeds two kilograms while the extra glucose retained over a period of one week during the high-salt intake may be as much as 350 grams. The total amount retained in the water stored during the period, if calculated on the basis of the blood sugar levels found at the time, would be no more than one per cent of the latter quantity. There is apparently not only better glycogen storage but also more rapid oxidation as indicated by the fact that the respiratory quotient tends to be higher during the high sodium chloride period. The possible relationship of the phenomena discussed to adrenal, pancreatic and pituitary functions is considered.

Discussion

DR. R. T. LA VAKE (Minneapolis): The importance of experiments of this type cannot be over-emphasized. It is to be hoped that such experiments will throw a great deal of light on the treatment of toxemias of pregnancy as a by-product. I would like to ask Dr. McQuarrie if he has experimented at all with magnesium sulphate as a neutral salt in this group of experiments. When Martin Fischer was here many years ago, he described his experiments with magnesium sulphate and since that time a great deal has been done in the use of magnesium sulphate in the toxemias of pregnancy, and apparently magnesium sulphate has a tendency to reduce the blood pressure. We put our toxemia patients on a salt-free diet with restricted fluids, a Carrel diet and use magnesium sulphate as a neutral salt.

This work of Dr. McQuarrie's is most interesting and instructive.

DR. H. L. ULRICH (Minneapolis): I was very much interested in this discussion. I would like to see cholesterol or rather esterol studies made on these patients. Many years ago some work was done on cholesterol as a possible cause of essential hypertension. Experimentally, it has been shown cholesterol increases the irritability of the smooth muscle cells of the body.

I would like to ask Dr. McQuarrie if there was a marked weight increase in these cases?

DR. McQUARRIE: There was an increase of about 2 kilograms in each patient during the high-sodium-chloride periods.

DR. ULRICH: Intercellular edema can be relieved by withholding salt; intracellular edema can be modified by potassium. The Germans use a term "das wasser-haushalt," or, literally translated, water household of the body which embraces all the water of the body and its physiology. There is a daily tide of water in our bodies amounting to 7 to 10 liters which never leave the body. The physiology of this large movement of water is not entirely clear. Recent experiments in a very accurate metabolism chamber demonstrated that the output of the kidney is controlled by the posterior pituitary. It would be very interesting to know the effects of sodium and potassium ions on the pituitary.

DR. McQUARRIE (in closing): In regard to Dr. La Vake's question, I believe that this is quite an important point of attack in eclampsia, and certainly there is water and salt retention in that condition. Also, Anselmo has shown that there is an increase of pitressin in the blood in eclampsia. I have used magnesium sulphate quite frequently in children with acute glomerular nephritis with arterial hypertension. Its beneficial effect has never been adequately explained on the basis of osmotic effect because we use so little. It is very effective. I believe now that its chief action may be on cell membrane permeability rather than on osmotic action. Potassium apparently antagonizes sodium in some as yet unknown way. Magnesium may have a similar action.

In regard to Dr. Ulrich's question about cholesterol, I can say that cholesterol is a profound narcotic when injected intravenously. Cholesterol mobilizes sodium

chloride and water from the tissues into the blood stream from whence it is excreted by way of the kidneys. So one would expect, if these studies hold up, that this would fit in very nicely with what has been said in regard to the effect of cholesterol on blood pressure.

The effect of lecithin, on the other hand, is quite the reverse; it increases irritability and retention of water.

DETACHMENT OF THE RETINA

C. N. SPRATT, M.D.

Minneapolis

Since the paper on retinal detachment by Dr. Burch was presented before this Academy, several men have asked me as to the details of the operation. I thought it might be of interest to show moving pictures, as this would convey a much better idea of the procedure than a lengthy description. This patient was struck in the right eye on Thanksgiving day, 1934. About five weeks later he noticed a blurring of his vision. Examination disclosed a tear of the retina. This was distinctly seen and located to be 18 millimeters back from the limbus and 30 degrees above a horizontal line. The vision was slightly affected, being 20/20 minus. The operation shown is the Walker modification of the diathermy method.

The meeting adjourned.

R. T. LA VAKE, M.D.
Secretary.

Meeting of January 9, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, January 9, 1935, with the president, Dr. Alexander Hall, in the chair. The meeting was called to order at 8:15.

There were fifty members and two guests present.

This being the occasion for the address of the retiring president, Dr. Hall announced that, with the approval of the members, the reading of the minutes of the previous meeting and other business would be dispensed with. Dr. Wilcox's address followed.

SIDE-VIEW SKETCHES OF PHYSICIANS*

ARCHA E. WILCOX, M.D.
Minneapolis

The meeting adjourned.

R. T. LA VAKE, M.D., Secretary.

*To be published separately.

TRANSACTIONS of the MINNEAPOLIS SURGICAL SOCIETY

MEETING OF JANUARY 10, 1935

The President, DR. MARTIN NORDLAND, in the Chair

VISUALIZATION OF THE BILIARY TRACT BY INJECTION OF RADIO-OPAQUE MEDIA POSTOPERATIVELY

N. Logan Leven, M.D.

(By invitation)

In recent years x-ray study of the various systems of the body by means of contrast media has furnished much information of diagnostic value. In addition to the cholecystography by the Graham-Cole method, radio-opaque media may be introduced into the biliary tract by a reflux from the gastro-intestinal tract and by injection of biliary fistulae or drainage tubes introduced into the biliary tract at operation. This paper briefly presents a study of the latter group.

The first study of the biliary tract by this method was made by Temsey and Patterson in 1922. They injected three-fourths of an ounce of bismuth paste into the external opening of a biliary fistula and demonstrated extensive filling of the liver ducts with an obstruction at the junction of the hepatic and cystic ducts. Their patient had a severe reaction, having pain, fever, and jaundice. After thirty-six hours, the paste began to come out the fistulous tract, bile flowed, and the distress was relieved.

Investigators since then have used various solutions, including sodium iodide, potassium iodide, various iodized and brominated oils, and solutions of thorium dioxide. We have successively used Lipiodol, Neo-Iopax, Neo-Skiotan and Thorotrast. Thorotrast is less viscid than Lipiodol and more radio-opaque than the iodine compounds used in intravenous urography, so that a more accurate filling and good visualization of the biliary tract is obtained by its use.

Technic.—In a patient a week or more post-operative, the study of the biliary tract is made, providing the patient has had no recent chills or fever. Any air in the drainage tube is evacuated with a syringe. Ten cubic centimeters of Thorotrast is allowed to run in by gravity or gentle pressure applied to the piston of the syringe. If the patient complains of pain, the injection should cease. One picture is taken immediately and another in ten minutes to determine the rate of emptying of the duct system.

Complications.—There have been very few instances cited of reactions following this procedure. In our series, one patient noted marked discomfort at the time of injection by gravity of Neo-Iopax into a T-tube. The following day she developed abdominal pain, nausea, vomiting, a temperature up to 103.8° F. and a pulse of 104. By the second day the symptoms had subsided. No reflux of media into the pancreatic duct was visible. On two previous studies this patient had no discomfort or untoward symptoms and on one occasion definite filling of the pancreatic duct was visible.

To the surgeon, visualization of the biliary tract post-operatively or in cases of persistent or recurring biliary fistulae is of great value.

In cases in which a T-tube has been placed in the common bile duct the patency of the duct may be inferred from indirect evidence.

1. Measurement of the external biliary drainage.
2. Macroscopic and chemical examination of the stool for bile pigments.
3. Disappearance of jaundice.
4. Effect of clamping the tube.
 - a. Discomfort.
 - b. Increase of jaundice.
 - c. Leakage about tube.

These criteria are not always reliable.

Suppression of biliary output due to liver drainage may result in a slow clearing of jaundice, light-colored stools, and only a small quantity of bile drainage. The evidence may also indicate a partial obstruction, the nature of which is not shown.

By means of cholangiography the anatomical and functional state of the biliary tract can be more accurately determined.

Patency of the cystic duct and common duct after cholecystostomy will determine if later intervention is necessary. This is of particular value in those bad risk cases in whom a prolonged exploration of the common bile duct is not warranted at the first operation.

In cases of persistent biliary fistula the cause and location of the obstruction can be quite accurately determined by cholangiography. The findings are of great value in planning subsequent surgical procedures.

Following choledochostomy it is important to know that no common duct obstruction is present before removing the T-tube.

Mirizzi in a reported series of one hundred cases has demonstrated the value of cholangiography, during operation, in determining accurately any existent pathologic condition in the common bile duct such as functional disturbances, stenosing pancreatitis anomalies and stones.

We have studied thirty-two cases post-operatively by this method, having made fifty injections of the biliary tract in all.

Slides were presented showing obstruction of the cystic duct due to stone; obstruction of the common bile duct due to stricture; stenosing pancreatitis; reflux up the pancreatic duct in cases of stricture, spasm at the sphincter and following stimulation of the sphincter by adrenalin injection; stone in the hepatic duct; and a case of congenital absence of the gall bladder.

Conclusions.—This method of study of the biliary tract is valuable in determining:

1. The cause of biliary fistulae.
2. The patency of the common bile duct and the presence of overlooked stones before removal of drainage tubes.
3. The existence of pathology in the common bile duct at the time of operation.
4. The normal and pathologic physiology of the common bile duct and the significance of reflux into the pancreatic duct.

SUBASTRAGALOID AND TRIPLE ARTHRODESIS

Vernon L. Hart, M.D.

(By invitation)

Arthrodesis or surgical ankylosis of a joint may be applied with the purpose of curing a disease, eliminating pain, correcting deformity and restoring the physiological function of joint stability. Subastragaloid arthrodesis and triple arthrodesis are established surgical procedures and are frequently indicated in the treatment of the following conditions:

1. The talipes, the club feet resulting from
 - (a) Infantile paralysis.
 - (b) Spastic cerebral paralysis.
 - (c) Muscular dystrophies.
 - (d) Peripheral nerve injuries.
 - (e) Spina bifida.
 - (f) Congenital contractures of the foot and ankle.
2. Tuberculosis of the tarsus.
3. Spastic and painful flat foot.
4. Chopart's amputation.
5. Subastragaloid infectious arthritis.
6. Subastragaloid traumatic arthritis.
7. Fractures and dislocations of the tarsus which involve and disorganize the normal architecture of the subastragaloid and calcaneocuboid articulations.

In this very brief paper I wish to consider the application of subastragaloid and triple arthrodesis in the surgical therapy of fractures of the os calcis.

The os calcis is fractured more frequently than any of the other tarsal bones and not infrequently fracture of the body of the os calcis is comminuted and intra-articular. The fracture lines may enter the subastragaloid joint or calcaneo-astragaloid and calcaneo-astragalo-scaphoid joints and the calcaneocuboid articulation. The normal articular mechanism may be disrupted and if not corrected the result may be a painful foot when the patient becomes ambulatory. As a rule, the laboring man suffering with this type of fracture experiences an unusually prolonged period of disability. There is no other industrial fracture of the extremities in which the resultant compensation and period of disability is greater than in this type of fracture of the os calcis.

The pain in the foot may be the result of several factors: (1) spur formations; (2) excess bone beneath and behind the external malleolus; (3) loose bone fragments; and (4) flattening of the arch of the foot. The most important factor, however, is the presence

of traumatic arthritis of the subastragaloid and calcaneocuboid articulations.

Weight bearing upon rough and uneven surfaces causes the patient greater pain than weight bearing upon a flat smooth surface. This is explained by the fact that the function of the subastragaloid and calcaneocuboid joints is to accommodate the foot to uneven surfaces when standing, walking or running. Weight bearing upon a perfectly flat surface involves the movements of plantar and dorsal flexion which are functions of the ankle joint. There are no lateral movements within the normal ankle joint. Weight bearing upon an uneven surface brings into play the various lateral movements of the foot which are functions of the subastragaloid and calcaneocuboid joints. Traumatic arthritis and adhesions involving these joints result in the loss of their functions or pain and disability of the foot with weight bearing upon rough and uneven surfaces.

The several lateral movements of the foot are adduction and abduction, inversion and eversion, supination and pronation. For all practical purposes these terms are synonymous since the movements of the foot around the longitudinal and the perpendicular axes do not occur independently but are combined.

Not infrequently this type of fracture may result in a serviceable and painless weight bearing foot even when the deformity was not reduced. Many patients with persistent pain and disability may be relieved by various alterations of the shoe and arch supports. For these reasons I do not recommend immediate subastragaloid or triple arthrodesis in comminuted intra-articular fractures of the body of the os calcis.

In the old fractures of the body of the os calcis, complicated with traumatic arthritis of the calcaneocuboid and subastragaloid joints and painful weight bearing, arthrodesis of the affected joints is definitely indicated if the pain can not be entirely relieved by more conservative measures.

THE TREATMENT OF SOME TYPES OF ARTERIO-VEINUS ANEURYSMS AND CAVERNOUS HEMANGIOMAS

William T. Peyton, M.D.

A case of traumatic carotid-cavernous aneurysm (pulsating exophthalmos) is reported which was successfully treated by the procedure suggested by Barney Brooks, namely, putting strips of muscle in the internal carotid artery of the ipsilateral side to occlude the fistulous opening by means of this artificial embolus.

Sinus pericranii (Stromeyer) or cavernous hemangioma of the scalp communicating with the dural sinuses through large defects in the skull was discussed and a case presented which had been treated by injections of sodium morrhuate solution and pressure. A satisfactory result was obtained.

Cases of cirroid (arterio venous) aneurysm of the scalp and cavernous hemangioma of the lip were presented.

CURRENT EVENTS IN ANESTHESIA

Ralph T. Knight, M.D.

The Horace Wells Memorial Congress of Anesthetists took place in Boston, October 15 to 19. It was opened by a memorial address by Charles J. Wells, head of the Department of Anesthesia, University of Syracuse, and president of the Associated Anesthetists of the United States and Canada.

During the Congress we were also shown a moving picture of the first public administration of ether by Morton. Some of you have probably seen this film at the Century of Progress. Our view of it was made doubly interesting by the fact that on the anniversary of the date, October 16, 1846, we sat in the very amphitheater, the old Ether Dome, of the Massachusetts General Hospital where Morton anesthetized his first patient and where the staff of the Massachusetts General Hospital reenacted the event for the film.

W. Chalmers-Francis, M.D., anesthetist of Los Angeles, presented "Some Medico-legal Aspects of the Nursing Anesthesia Problem."

William Temple, Jr., M.D., of Boston, described "The Boston Anesthesia Service." This is a group of seven or eight physician anesthetists, who, though not practicing in partnership, have a combined twenty-four telephone service at a central office where their appointments are made. They also rotate in remaining immediately available evenings, nights, and holidays.

The scientific program contained many interesting papers.

Mr. W. Etherington-Wilson of Torquay, Devon, England, gave his technic of spinal anesthesia. He has experimented with glass tubes containing fluid of specific gravity equal to spinal fluid. Into these he has injected lighter fluid (percarine solution sp. g. 1.003 of a different color) with the tubes in all manner of different positions. He has found that in the vertical position the diffusion and mixing is most constant and even, and raises a given distance in a dependably constant length of time. Clinically, for low abdominal anesthesia he injects 8 to 10 c.c., waits twenty-five seconds in the vertical position, and tips the patient quickly prone with head ten degrees low. For medium abdominal he injects 10 to 12 c.c. and waits thirty-five seconds. For high abdominal he injects 12 to 14 c.c. and waits forty-five seconds. He had done only eighty-five clinical cases, but Ronald Jarman, an anesthetist of London who was also present, reported in discussion 500 cases which he had done by the essayist's technic with very satisfactory results.

Professor A. M. Dogliotti of Torino, Italy, reported his work in relieving intractable pain by intraspinal injection of absolute alcohol. He places the patient on the side, with the affected side up, turned slightly forward to bring the posterior roots uppermost, and injects at the level of the nerve or nerves from the painful area. A subaracnoid injection of the alcohol is slowly made using 0.3 c.c. if in the cervical or thoracic region, and 0.5 c.c. to 1 c.c. if in the lumbar or sacral region.

Professor William B. McNider of the University of North Carolina gave a paper on the Susceptibility and the Resistance of Tissue Cells to General Anesthetics, especially Ether and Chloroform." He showed that senile kidneys contain more lipid material in the convoluted tubule cells and in the endothelial cells of the glomerular capsule than is contained in youthful cells. They are therefore more easily anesthetized and even necrosed by ether and chloroform. If the kidneys are first suffused by alkali or by glucose they are changed to approach youthful cells and are not so subject to damage by the anesthetic. The same applies to liver cells. Starvation as well as increased lipid content increases their susceptibility to anesthesia and necrosis. If the central cells of the lobule are necrosed they are replaced by new atypical cells which are not as susceptible to repeated anesthesia.

I. S. Ravdin and Samuel Goldschmidt of the University of Pennsylvania showed in their paper that an abundance of oxygen had much the same effect as alkalization and glucose in the prevention of liver damage.

A paper on "Intravenous Evipan Anesthesia" was given by Ronald Jarman and A. Lawrence Abel of London. They reported several hundred cases, stressing the importance of a pause of fifteen to thirty seconds after injecting half of the computed dose. This is because doses computed by weight are not entirely reliable as to susceptibility. The dose is about 100 mgs. per 20 pounds of patient. Anesthesia lasts fifteen to twenty-five minutes.

Frederick A. Collier, Professor of Surgery, University of Michigan, read a paper on "Studies in Water Requirements of Surgical Patients." He had estimated the water loss through perspiration on the operating table and during the recovery period and pleaded for lighter covering.

A presentation of divinyl ether was given by Wesley Bourne, Department of Pharmacology, McGill University. This substance is a liquid given by inhalation. It is very rapid and powerful but non-toxic. It may be given on the open mask but is used best with oxygen.

A further report on cyclopropane was given by Irwin R. Schmidt, Professor of Surgery, and Ralph M. Waters, Professor of Anesthesia, University of Wisconsin. They had used it in 2500 cases and stated that it has now in their clinic practically supplanted ethylene and largely supplanted ether. Its record in operative mortality and post-operative complications is favorable compared with other anesthetics.

Gold and Gold of Cornell University Medical School again reported their investigation of the deterioration of ether after opening, and their conclusion that the deterioration is usually slow and the incidence small. They suggest the use of U.S.P. ether out of large drums, the ether to be tested daily before use.

I do not know how much evipan, or evipal as it is named in America, is being used in Minneapolis. I have used it three times on one patient, all at the Minneapolis General Hospital, each time for fulguration of a small carcinoma in the lower third of the

esophagus. The anesthesia was prolonged each time to over half an hour by repeated fractional injections. It was very satisfactory.

We have used no divinyl ether.

We have been using bulk U.S.P. ether at both hospitals since September and it has proved very satisfactory. It gives us newly tested ether daily at a reduced cost, both of which are worth-while advantages.

I have given about 75 cyclopropane anesthetics. One was for resection of the pancreas and splenectomy by Dr. Wangenstein, providing a perfectly satisfactory anesthesia. Two of my early cases were gallbladders for which I had to supplement with half an ounce of ether. Other gallbladders since then have not required ether. Most of the cases have been gynecological operations, and for this group at least, I consider cyclopropane the most ideal anesthetic at present available.

VARIATIONS IN THE TECHNIC OF THORACOPLASTY

Herbert A. Carlson, M.D.

(By invitation)

Thoracoplasty is performed for one of three reasons: (1) to collapse the lung in the treatment of pulmonary disease; (2) to permit closure and healing of a chronic empyema cavity; or (3) to correct a deformity of the bony thorax. At the present time the operation is most commonly employed as a form of collapse therapy in the treatment of pulmonary tuberculosis.

The early Brauer-Friedrich operation, in which the entire lengths of the second to tenth ribs were resected in one stage, proved to be too severe and it led to a great deal of chest wall flapping.

The Wilms-Sauerbruch thoracoplasty was based upon the sound principle of resecting the paravertebral segments of the ribs, thus obtaining a maximum collapse for the rib lengths removed. This principle is true because: (1) the paravertebral segment has the greater convexity; (2) the more pliable costal cartilage anteriorly permits the rib to swing inward towards the vertebral column; and (3) most of the cavities are situated posteriorly.

The paravertebral resection of ribs has led to satisfactory results in many cases. However, it has been recognized in recent years that failures in the treatment of pulmonary tuberculosis by thoracoplasty have usually been due to inadequate collapse of large or rigid walled cavities. The recognition of this fact has led to modification of the technic of thoracoplasty.

In order to remove long segments of ribs it is wise to perform the operation in three or more stages (illustration by films). A paravertebral thoracoplasty may be supplemented by an anterolateral stage consisting of the resection of the anterior rib stumps together with the costal cartilage through an axillary incision (illustration by films).

During the past few years O'Brien of Detroit has advocated complete excision of the upper three ribs as

the first stage of thoracoplasty. Other stages can be carried out subsequently as indicated. Even this procedure may apparently be inadequate in some cases as the costal cartilages remain.

Eden and Robinson, and Wilms have recommended a procedure in which posterior thoracoplasty is combined with resection of small segments of the costal cartilages in order to increase the collapse. This operation appears to be sound but has never become popular.

In this hospital we have recently employed a method which was first suggested by Dr. Wangenstein. In this type of thoracoplasty the costal cartilages and anterior extremities of the cartilages are resected as a preliminary procedure through two short, horizontal incisions. Usually the second to the fifth ribs are resected under local anesthesia. Very little pulmonary collapse results and there is little post-operative reaction. About one week later an upper stage posterior thoracoplasty is performed, the entire lengths of the upper three ribs being resected from the transverse process to the point of previous resection. The resection of the long rib segments is greatly facilitated by the preliminary anterior costo-chondrectomy. Subsequently complete excisions of the other divided ribs may be performed and further resections may be continued as indicated. (Illustrated by films.)

When extensive resections are required this method is rivalled only by paravertebral resection combined with anterolateral thoracoplasty. It has the advantage that the preliminary anterior chondrectomy is a minor procedure compared with anterolateral thoracoplasty.

Films are also shown to illustrate Schede thoracoplasty in the treatment of chronic empyema. Failures in these cases are often due to inadequate unroofing. The best results are obtained if the cavity is completely saucerized.

LITHOLAPAXY

C. D. Creevy, M.D.

(By invitation)

It is the economy and usefulness of litholapaxy, not its novelty, which prompt me to discuss it here tonight. The idea of crushing stones with an instrument inserted through the urethra occurred to surgeons very early, since it is known to have been attempted in the ninth and sixteenth centuries. It was tried only sporadically until the days of Civiale, who first carried it to a successful conclusion in 1824, and subsequently reported twelve other successful cases. He used a folding claw to grasp the stone through which a hole was then drilled by a conical rod. The stone was then broken by striking the rod with a hammer. The patient was then allowed to void the fragments spontaneously.

Sir Henry Thompson devised the first modern instrument with a male and fenestrated female blade and a screw handle with a lock, from which subsequent instruments have changed but little, except for the addition of telescopes and lights to some of those designed to crush small stones.

The operation was associated with a fairly high mortality until Bigelow of Boston in 1878 decided that the bad results were due, not to the crushing of the stone, but to the trauma to the bladder from the sharp fragments, inflicted during subsequent micturition. He designed his evacuator and was the first to crush a stone and remove it at one sitting.

The present day operation is essentially unchanged. The Keyes lithotrite, for large stones, is much like the Bigelow instrument, and is adapted to stones up to two inches in diameter. It is not recommended for larger stones unless unusually soft, since the operation is likely to be too prolonged. Occasionally a stone too hard to crush will be encountered. The Ravich cystoscopic lithotrite is useful for small calculi which may be crushed quickly under direct vision.

Other than excessive size of the stone, there are but few contraindications to litholapaxy. Among these are: (1) severe and active infections such as would interdict any intravesical manipulation; (2) a very large prostate which bleeds freely on manipulation, or a very small bladder which affords insufficient room for the instrument; (3) inability to insert the instrument; (4) the presence of multiple diverticula into which fragments may fall and defy removal, or in which the original stone is lodged; and (5) the presence of a large hard foreign body as a nucleus in the stone.

The technic is simple, if somewhat tedious. The instrument is introduced like a sound after the injection of a small amount (100 to 150 c.c.) of water into the bladder. The blades are turned up, opened, and the base of the bladder depressed so that the stone rolls into the jaws, which are then locked; the stone is crushed by turning the handle. This is repeated until no large fragments are found. The lithotrite is then replaced by a cannula or large cystoscope and the fragments evacuated by alternate injection and suction with the evacuator or with a syringe. Cystoscopy is then done to determine whether all fragments have been removed, and a catheter is tied in for a day or two. The obstructing prostate may be dealt with by transurethral resection at the same sitting if the stones are small; if the litholapaxy has been long, this is better deferred. In many instances the history will indicate that the stones originated in the upper urinary tract and were held in the bladder by a slightly enlarged or contracted gland. In such cases one need remove only the stone.

In the University Hospital from January, 1933, to January, 1935, litholapaxy has been performed twenty-seven times while suprapubic lithotomy was employed but five times. Litholapaxy was combined with other procedures, chiefly transurethral resection, in eighteen cases, and constituted the only operation in nine. The post-operative hospital stay averaged nine days in the whole group, and 4.2 days after litholapaxy alone. When one considers that the minimum period of hospitalization after suprapubic lithotomy is about ten, and the average twenty-one days or more, the advantage of the method is at once apparent. Employed in conjunction with transurethral resection when neces-

sary, it has the same advantages over the suprapubic operation that resection holds over prostatectomy. It is tending to replace open operation just as resection is, the latter having been used here in 251 of 263 cases (95 per cent) in the past two years. The net result is, I believe, a distinct boon to elderly men.

BIOLOGICAL PHENOMENA IN HODGKIN'S DISEASE

Melville H. Manson, M.D.

(By invitation)

At the present time the etiology of Hodgkin's disease is unknown, but since the latter part of the last century a host of etiological suspects have been investigated. Although there is much conflicting evidence and the matter is not settled, it is generally believed that the tubercle bacillus, originally believed by Sternberg to be responsible for Hodgkin's disease, the various mycoses, spirochetes, and the gamut of diphtheroid bacilli which have been variously incriminated are not the responsible agents. Recently M. H. Gordon, consulting bacteriologist of St. Bartholomew's hospital in London, has made a very thorough and systematic search for an etiological agent or agents including spirochetes, tubercle bacilli, various moulds and yeasts (some of which were found to produce granulomatous lesions in animals but differing from Hodgkin's histologically), and finally has searched for a virus.

Time will not permit an account of Gordon's reasons for suspecting a virus or a recital of his interesting investigations. Briefly his procedure and results are as follows: Lymph nodes were taken from patients by biopsy or aseptically at post mortem examinations and transferred to the laboratory in sterile containers, placed in sterile Petri dishes and sliced. One piece was dropped into fixing fluids for histological examination, while the remainder was ground in a sterile mortar. Part of the mince was diluted in sterile water, saline or broth, and placed in a refrigerator. After several days the 0.5 c.c. of the node suspension was injected intracerebrally and intravenously into rabbits. This interval of refrigeration is not readily explainable but it was discovered accidentally by Gordon that such preparations were pathogenic whereas fresh suspensions were not.

After an average incubation period of about four days the injected rabbit shows encephalitis-like symptoms consisting of ataxia, paresis, or paralysis of the hind legs, opisthotonus, often mystagmus and a marked loss of weight. Such a syndrome has been called a positive Gordon's test for Hodgkin's disease. Gordon demonstrated the presence of the pathological agent in nineteen out of twenty cases of Hodgkin's, while nodes from forty-three control cases prepared in the same manner were all negative. These control cases included leucemia, sarcoma, tuberculosis, simple hyperplasia, carcinoma, melanoma, lymphosarcoma, normal gland, etc. Van Rooyan, a student of Gordon's, has tested material from twenty cases of Hodgkin's disease and found fifteen of these (75 per cent) to give posi-

tive Gordon's tests. None of his twelve control glands gave positive tests.

It was believed that this work was important enough to investigate, both because of the aid that the test might offer in the cases often encountered where an exact differential diagnosis by microscopic examination is difficult and because of the information that might be gained in exposing an etiological agent. My part in this investigation thus far has consisted largely of following the clinical aspects of the patients and procuring some of the material, the great majority of the work having been done by Dr. Byron Olson and Miss Hazel Dunlap of the Department of Bacteriology.

The technic employed was exactly the same as that used by Gordon and Van Rooyan. All nodes or other material were cultured aëroically and anerobically prior to inoculation into the animals. Cultures were also made of heart blood, spleen, brain, and in some instances of the liver of all killed animals and were quite uniformly negative. Microscopic sections have been made of the brain, lymph nodes, and spleen of some of the animals which showed positive reactions to the injection of Hodgkin's material, and show no significant pathological change.

The reaction in rabbits as we have observed them may be divided into an acute stage, as described by Gordon, with encephalitis-like symptoms, and a more chronic form in which the most marked symptom is cachexia and weight loss. The incubation period in the acute form is from one to six days, averaging 3.5 days. In the chronic form the incubation period averages 21 days (18.30). The average weight loss in all positive rabbits was 615 grams, while the control rabbits averaged a gain of 482 grams in weight.

Results.—(Chart I.) Material from thirty-five patients has been examined, of which number fifteen were Hodgkin's and twenty represent a variety of unrelated pathological and normal lymph nodes or other tissue including tuberculosis, simple hyperplasia, leukemia, benign lymphadenitis, lymphosarcoma, metastatic adenocarcinoma, fibrosarcoma, lymphoepithelioma, and a node from a case of mesenteric lymphadenitis.

The nodes from the fifteen Hodgkin's cases gave nine positive Gordon's reactions in rabbits. Six revealed no pathogenicity. Thus it is evident that the procedure cannot serve as a specific or even a reliable test in the diagnosis of Hodgkin's disease. The pathological diagnosis of Hodgkin's disease in the majority of our cases was made by Dr. Bell, who also examined several other slides concerning which there was some question as to interpretation.

When six negative Gordon reactions were obtained from unquestioned Hodgkin's material as determined by microscopic examination, it was thought that perhaps x-ray treatment might have influenced the pathogenic agent. As noted in the table the material from the four treated cases gave three negative Gordon reactions and one positive. This might lead one to suspect that x-ray treatment in vivo diminishes the virulence or destroys the pathogenic agent. Van Rooyan treated Hodgkin's material which gave positive rabbit reaction with ten skin unit doses of x-ray and found

CHART I

Type of material	Gordon positive cases		Gordon negative cases	
Untreated Hodgkin's disease.....	8		3	
Treated Hodgkin's disease.....	1		3	
Tuberculosis.....	2		4	
Hyperplasia.....	1		2	
Leukemia.....	1		1	
Other tissues and nodes in the control series included lymphosarcoma, metastatic squamous cell carcinoma, metastatic adenocarcinoma, fibrosarcoma, lymphoepithelioma, mesenteric adenitis, and normal lymph nodes. All (9 cases) were negative.				
Total number of cases	Gordon positive cases per cent		Gordon negative cases per cent	
Hodgkin's disease—15....	9	60	6	40
Controls—20.....	3	15	17	85
Transmission experiments using brain, lymph nodes, and serum from positive rabbits were all unsuccessful.				
Immunity experiments, both passive and active, were all negative.				
Extraction of Hodgkin's material by Friedmann's method gave positive results on intracerebral inoculation into rabbits.				

that the pathogenicity was not influenced. It is possible that x-ray treatments in vitia and in vivo have a different effect on the tissue.

Of more importance to the estimation of Gordon's test as a diagnostic procedure is the fact that two definitely positive tests were secured with nodes from two cases of tuberculosis and one from a case of simple hyperplasia of the gland. Thus 15 per cent of the controls gave positive Gordon's tests.

Transmission experiments were done in several instances, using brain suspensions, lymph nodes, and spleen from rabbits with the encephalitic-syndrome, but always with negative results. A few experiments have been done in an attempt to establish an immunity in a rabbit to the pathogenic agent. No immunity is evident in recovered rabbits nor can an immunity be established thus far.

The pathogenic agent described by Gordon and his associates is assumed to be a filterable virus, although to date Gordon has been unable to demonstrate pathogenicity in filtrates of the node suspensions. Van Rooyan, by regulating the pH of his filters has succeeded in obtaining a pathogenic filtrate. Of some interest in connection with the nature of the pathogenic agent, is the report of Friedmann, in 1932, in which he describes a pathogenic agent in normal bone marrow, spleen, and leukocytes, that will produce the same reaction when injected intra-cerebrally into rabbits. This agent is, according to Friedmann, a proteolytic ferment. We have prepared an extract of Hodgkin's nodes according to Friedmann's methods and observed pathogenicity comparable to that observed with suspensions of the nodes. As the preparation of the extract necessitates extraction with acetone, precipitation and washing with absolute alcohol and ether, mixing with glycerine and further exposure to alcohol and ether, it hardly seems probable that the pathogenic agent

could be a filterable virus. This is the first time to our knowledge that Hodgkin's material has been so prepared for animal inoculation.

Discussion.—Until a larger amount of material has been subjected to further experimentation it would not be justifiable to conclude that the phenomena reported by Gordon is of no significance. We believe that the test is not specific for Hodgkin's disease and that the pathogenic agent present is not a living organism. This work is incomplete at the present time but of sufficient interest to justify its continuation. Of particular interest will be a follow-up of the patients whose lymph nodes gave what we believe to be false positive reactions and those cases which we believe to be Hodgkin's whose nodes gave negative Gordon's reactions.

THE SURGERY OF HYPERINSULINISM

Owen H. Wangenstein, M.D.

Our knowledge of the functions and diseases of the pancreas has been elaborated by a process of slow growth. Claude Bernard established the significance of the pancreatic secretions in digestion in 1856. In 1889, v. Mering and Minkowski excised the pancreas in dogs and fixed attention upon the intimate relationship between diabetes and pancreatic disturbance. It was not until 1922, however, when Banting and his associates isolated the internal secretion of the pancreas that speculation concerning the function of the islands of Langerhans, described by him in 1869, was finally settled. This epoch-making discovery fathered the thought that hyper as well as hypo function of this activity of the gland may exist. The symptoms attending an occasional exceeding of the physiologic requirements of a diabetic for insulin revealed what the signs of hypoglycemia were, and occasioned Seale Harris, in 1924, to predict the spontaneous occurrence of hyperinsulinism. In 1928, Wilder and his associates at the Mayo Clinic recovered insulin from the tumor tissue of a metastasizing neoplasm of the pancreas. In 1929, Howland and his associates at Toronto reported the first excision of an insulogenic tumor from a patient with hypoglycemia with complete alleviation of the symptoms. In the few intervening years which have since elapsed, a number of such patients have been seen and successfully operated upon. Graham writes in a recent paper that five patients have been relieved of the complaints of hypoglycemia by excision of a tumor of the pancreas at the Barnes Hospital alone.

One cannot help but remark how blind we were to this disturbance which we may now all recognize since our eyes have been opened by those "who went out not knowing whither they went." It is easy to follow a blazed trail well marked with sign posts. These small adenomas of the pancreas have long been well-known to pathologists, and clinical bloodsugar determinations have been made for more than twenty years, yet clarification of the rôle of these small tumors in the causation of convulsive seizures awaited the assimilation of new-found facts. Dr. William J. Mayo has well said that a new fact may change the entire complexion

of a problem. To how many other problems are we still blind that lie at our very elbows awaiting the proper range of vision for their solution?

Three patients with hypoglycemia have come under the writer's observation and have been operated upon at the University Hospital. In two, insulogenic tumors were removed with return of the blood-sugar to normal values and relief of symptoms. In the third no tumor was found and re-exploration is contemplated. One patient with established and another with possible hyperinsulinism have also been observed at the hospital. One, a male of forty-five years, came in January, 1931, complaining of weakness and spells of unconsciousness which were interpreted as idiopathic epilepsy. This patient subsequently went to the Mayo Clinic where the nature of his illness was correctly identified; an adenoma was removed from his pancreas by Dr. Judd, who reported the patient as well in 1933. The other was a woman of forty years admitted with a perforated duodenal ulcer, who died of peritonitis five days later. In her rather brief convalescent period, she occasionally complained of hunger sensations. At postmortem, in addition to peritonitis, an oval, reddish-yellow tumor well encapsulated, measuring 5.5 centimeters in diameter, was found. In the middle of the liver a metastatic nodule one centimeter in diameter was found possessing the same histologic appearance as the tumor in the pancreas which was interpreted as a carcinoma of the pancreatic islets. Unfortunately no blood-sugar determinations were made. No convulsive seizures had ever been suffered by the patient.

The histories of the three patients submitted to operation are so illustrative of the symptoms and findings common to patients with hyperinsulinism as to merit brief relation.

1. Mr. P. H., aged twenty-eight years, hospital number 625929, was admitted March 22, 1934, with the complaint of spells of weakness since May, 1934, and convulsive seizures and periods of unconsciousness dating from February, 1931. He soon learned that eating tended to relieve the spells of weakness and forestall the convulsive seizures. Prior to July, 1933, the convulsive seizures and periods of unconsciousness were relatively infrequent. Since then, despite frequent taking of food, these seizures have occurred once or twice a day. The physical examination was essentially negative. The blood pressure was 135/70.

Examination of the blood and urine revealed no abnormal findings. Four fasting blood-sugars at various times after admission gave the following findings: 15.5, 21.5, 23.0 and 40.0 milligrams of sugar per 100 cubic centimeters of blood. Blood-sugar determinations made during attacks of unconsciousness varied between 15 and 50 milligrams. The sugar tolerance was as follows: fasting blood-sugar 46 milligrams, at one-half hour intervals afterward; 154, 186, 210, 260. There was no sugar in the urine at any time following the test.

Under cyclopropane anesthesia exploration of the abdomen was done April 30, 1934. A small tumor located on the dorsal surface of the pancreas in its distal third was felt. Because of the difficulty of getting at it, the tail of the pancreas including the tumor was excised. The wound was closed without drainage; the patient made what appeared to be an uneventful convalescence, but returned later with slight fever and presented tenderness below the left costal margin. A diag-

nosis of subphrenic abscess, probably small, was made, as inferred from the shadow observed on a radiogram after inflation of the stomach and colon with air. Under conservative treatment alone it cleared up and the patient has remained well. There have been no further convulsive seizures and blood-sugar determinations have shown consistently normal values. The tumor was roughly spherical and measured twelve millimeters in diameter. It was reddish-purple in color and was identified histologically as an adenoma of the pancreatic islets.

2. Mrs. L. W., aged 37, hospital number 630202, was admitted to the neurological service on August 14, 1934, with the complaints of weakness and convulsions. The patient was admitted to hospital during a convulsive seizure. There were clonic and tonic contractions accompanied by carpopedal spasms. The blood-sugar was found to be 30 milligrams per cent. Intravenous glucose solution was administered and the patient was aroused from a semi-stupor at once. These spells commenced about a year ago, and the patient's husband had learned that the oral ingestion of orange juice helped to awaken her.

The weakness had been so extreme that she had been confined to her bed. There had been complete disorientation and confusion. Her conversation had been unintelligible, and patient had been incontinent. The appetite had always been good.

Two years ago a subtotal thyroidectomy was done elsewhere for an adenomatous goiter without hyperthyroidism. The past history otherwise has no bearing on the present complaint.

Apart from the obviously impaired mental status, the notable physical findings were: (1) moderate emaciation; (2) a persistent adenomatous nodule in the right lobe of the thyroid. The blood pressure was 112/80. Fasting blood-sugars varied between 31 and 66 milligrams per cent. On October 14, 1934, the patient was transferred to the surgical service. Operation under ether anesthesia disclosed a small, reddish-yellow, unencapsulated tumor on the superior and ventral aspect of the pancreas. A frozen section made during the course of the operation was interpreted as a low-grade adenocarcinoma. In view of this absence of encapsulation and the histologic findings, a resection of a considerable portion (three-fifths to two-thirds) of the pancreas was done. The omentum was carefully sutured over the site of amputation of the pancreas, and a soft, rubber drain was led out through a stab wound. The convalescence was without marked reaction and the patient was retransferred to the neurologic service ten days later.

There have been no recurrences of the convulsive seizures and the patient has steadily improved. The blood-sugars have been consistently normal since operation. Dr. Bowman, who prescribed for her daily wants once made the naive observation that her conversation in the post-operative period was about equally divided between calling for "Daddy" and "potatoes." When recently admitted for a few days' observation she could carry on an intelligent conversation. She was again fully continent of urine and feces and her strength had improved to the extent that she could sit up unaided.

3. Mr. F. M., aged twenty-nine, hospital number 623663, was first admitted to the University Hospital on January 7, 1934, with the complaints of attacks of weakness, perspiration, and increased irritability, with periods of unconsciousness. The patient has had an obvious acromegaly of several years' standing. The first convulsive seizure occurred in April, 1933, and the patient was taken to Rochester, Minnesota, in an unconscious state. The blood-sugar was 46 milligrams per cent. The patient promptly regained consciousness following intravenous administration of glucose solution. The patient was tried out on a regime of fre-

quent feeding but returned for exploration of the pancreas at a later date. This operation was done by Dr. Judd on June 21, 1933. There were no abnormal gross findings in the pancreas. A portion of the tail of the organ was excised but was found to be normal on histologic study. Following his dismissal the patient gained forty pounds in weight with frequent feedings, but weakness and convulsive seizures still persisted.

On admission to the University Hospital early in 1934, because of the obvious acromegaly as indicated by the large hands and feet, prominent supraorbital ridges and large nose together with tufting of the distal phalanges (though the sella was normal), cross-fire x-ray treatments were applied to the hypophysis but without evidence of improvement after the elapse of several months.

He was again admitted in the summer of 1934 and at the request of the Medical Service exploration of the pancreas was done July 23, 1934. Dr. Russell Wilder of the Mayo Clinic who had seen the patient meanwhile, had suggested that a small tumor previously not demonstrated might now have grown to palpable size. A thorough exploration was carried out and the pancreas was freed up wherever possible to permit of palpating the organ on both superior and inferior surfaces. No abnormalities could be made out. In the process of exploring the pancreas, the organ was fairly well separated from its bed of adventitious tissue.

After operation until the time of dismissal on August 10, 1934, the blood-sugar did not fall below 74 milligrams per cent and there was no recurrence of hypoglycemic attacks. On August 29, five weeks after the exploration, another convulsive seizure occurred and seizures have continued periodically since.

On September 24, 1934, in a subsequent admission hemorrhoidectomy was done because of rectal bleeding. Ether anesthesia was given to the same depth and for the same length of time as at the previous exploration. On completion of the operation, the patient's blood-sugar was 240 milligrams per cent. A few hours later, it dropped to 72 milligrams per cent, and the following morning the patient had another hypoglycemic convulsion.

We have been debating the advisability of re-exploration of the pancreas with the thought in mind that subtotal pancreatectomy be done.

Comment: The two outstanding clinical problems in dealing with cases of chronic hypoglycemia are essentially (1) the identification of instances of hypoglycemia as being due to hyperinsulinism. It is immediately apparent that hypoglycemia and hyperinsulinism are not synonymous, for hypoglycemia may be due also to disturbances of pituitary, adrenal, liver, and other complex functions not understandable in the present state of our knowledge. A means of differentiating the hypoglycemia of hyperinsulinism from that of other causes yet remains to be established. (2) The manner of dealing with instances of chronic hypoglycemia in which a tumor of the pancreas cannot be demonstrated at operation is not a matter of general agreement. In the September issue of *The Southern Surgeon* for 1934 Simon of Birmingham presents two tables, each containing nine cases; in the first, all had tumors in the excised specimen of pancreas and all except the first case, who had a carcinoma, have remained well following operation; in the other nine cases in Table II, no tumor was found but a portion of the pancreas was excised nevertheless. In eight of these only temporary improvement followed; in the ninth, Simon's case, all but the head of the pancreas was ex-

cised and at the time of the report, eleven months later, the patient was well. Similarly Graham and Hartmann report ("Surgery, Gynecology, and Obstetrics, September, 1934) the instance of a one-year old infant in which Graham excised 80 to 90 per cent of the pancreas for chronic hypoglycemia in which excised specimen no tumor was found. The patient was well fourteen months later when the report was made. From his own experience, however, Judd (discussion in "Western Surgical Association," 1934) is inclined to believe that one should not be too optimistic over the expected results in instances of chronic hypoglycemia in which no tumor is demonstrated.

In addition to these clinical problems there yet remains to be determined the biologic character of some of these pancreatic tumors. That non-functioning adenomas may exist in the pancreas without causing hypoglycemia has been established; they may also be present in the pancreas in diabetes. Whether some of the tumors, though small, described as carcinomas will exhibit the features of metastases and recurrence common to malignant neoplasms remains to be determined. The unusual clinical behavior of mixed tumors in its sister serous gland, the parotid, in the light of its histological features, which are frequently those of an adenocarcinoma with cartilage, is well known.

Discussion of Dr. Wangenstein's Paper

DR. RUDOLPH W. KOUCKY said that the histology of these tumors of the pancreas is roughly that of the normal islets of Langerhans. There is a specific secretory granule, called the Beta granule by Bensley, which characterizes the islet cell. These granules have been identified in some of the tumors reported in the literature. In our own group of three cases, these granules were demonstrated once. The practical importance of this point is that when such a tumor is removed it should be immediately fixed in a chromate solution in order to preserve these granules. The pathology in the remainder of the body is not very marked. There is a loss of glycogen in the tissues. Some changes have been described in the nerve cells by Terbuggen. These consist of swelling and atrophy. The process apparently is reversible. It is estimated that the normal secretion of the pancreas is about nine times that required by the body. Since many of these tumors have been very small, it is difficult to see how they could produce a hyperinsulinism, in the presence of such a normal excess. It has been suggested that the secretion of the islets is a perverted one. The hypoglycemia found in patients without tumors of the islets is extremely interesting. Such a condition has been reported at least three times with carcinoma of the liver. It has also been reported with tumors of the adrenal, with inflammatory lesions of the adrenals, and conditions in which no pathology was demonstrated. The cause of these cases of hypoglycemia has not been explained.

Respectfully submitted,

F. A. OLSON, *Secretary*.

WOMAN'S AUXILIARY

President—MRS. MARTIN NORDLAND, Minneapolis

Editor—MRS. C. F. EWING, Wheaton

St. Louis County

Mrs. Harry Klein opened her home for a luncheon of the St. Louis County Medical Society Tuesday, April 2. Mrs. Gage Clement, Mrs. Nathan Braverman, Mrs. Arvid Hedberg and Mrs. R. M. Mayne assisted. Mrs. Arvid Hedberg, vice president, presided at the business meeting which followed the luncheon.

A Valentine Bridge Luncheon was held at the home of Mrs. W. A. Coventry for the February meeting. The usual Christmas baskets were packed for the rural communities this year, and cod liver oil was supplied for the rural districts.

A new plan of increasing the fund in the treasury has proved successful. Fifty cents is charged for luncheons as usual, but six members furnish the luncheon and donate the food and the fifty cents goes into the treasury so that in this way about \$15.00 is cleared every month.

Mower County

The Women's Auxiliary of the Mower County Medical Society met Monday afternoon, March 25, at St. Olaf Hospital for its annual session, Mrs. G. E. Hertel presiding. There were seven members present. The following officers were elected for the coming year: President, Mrs. Hertel; vice president, Mrs. P. A. Loomen; secretary, Mrs. R. S. Hegge, and treasurer, Mrs. P. A. Robertson. Reports were given by the secretary, treasurer, *Hygeia* and sewing committees. During the year ten layettes were made and given to needy families. The last two meetings have been devoted to making surgical dressings for the hospital. Light refreshments were served by Miss Hattie Rost, the superintendent.

This past year eight meetings have been held, on the fourth Monday in the month. No meetings were held in June, July, August and December.

FORTIFICATION OF FOODS OTHER THAN DIETARY STAPLES WITH VITAMIN D

The Committee on Foods reports that there is no convincing evidence from the standpoint of public health of a need for the fortification of foods with vitamin D other than such staple products as milk, cereals and bread, which form the basis of the customary diet of the public throughout the year. Examples of foods not warranting fortification with vitamin D are sausage and ice cream and such accessories as chewing gum.—*Journal A. M. A.*, February 16, 1935, p. 563.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

BOOKS RECEIVED FOR REVIEW

WHAT YOU SHOULD KNOW ABOUT HEART DISEASE. Harold E. B. Pardee, M.D. Asst. Professor of Clinical Medicine, Cornell University Medical School, etc. 127 pages. Illus. Price, cloth, \$1.50. Philadelphia: Lea & Febiger, 1935.

MARTINI'S PRINCIPLES AND PRACTICE OF PHYSICAL DIAGNOSIS. From the authorized translation by George J. Farber, M.D. Edited by Robert F. Loeb, M.D. 213 pages. Illus. Price, cloth, \$2.00. Philadelphia: J. B. Lippincott Co., 1935.

THE NERVOUS PATIENT. Charles Philipps Emerson, M.D., Research Professor of Medicine, Indiana University School of Medicine. 453 pages. Price, cloth, \$5.00. Philadelphia: J. B. Lippincott Co., 1935.

PHYSICAL DIAGNOSIS. Seventh Edition. Warren P. Elmer, B.S., M.D., Assoc. Professor of Clinical Medicine, Washington University School of Medicine, etc., and W. D. Rose, M.D., Late Associate of Medicine, University of Arkansas. 919 pages. Illus. Price, cloth, \$8.00. Saint Louis: C. V. Mosby Co., 1935.

PHYSIOLOGY IN MODERN MEDICINE. Seventh Edition. J. J. R. MacLeod, M.B., LL.D., D.Sc., F.R.C.P., Regius Professor of Physiology Univ. of Aberdeen, Scotland, etc. Assisted in Present Edition by Philip Bard, et al. 1154 pages. Illus. Price, cloth, \$8.50. St. Louis: C. V. Mosby Co., 1935.

A TEXTBOOK OF SURGERY. Second Edition. W. Wayne Babcock, M.D., F.A.C.B., Professor of Surgery and Clinical Surgery, Temple University, etc. 1312 pages. Illus. Price, \$10.00, cloth. Philadelphia: W. B. Saunders Co., 1935.

METHODS OF TREATMENT. Fifth Edition. Logan Clendening, M.D., Clinical Professor of Medicine, University of Kansas, etc. 879 pages. Illus. Price, cloth, \$10.00. St. Louis: C. V. Mosby Co., 1935.

DISEASES OF THE SKIN, Ninth Edition. Richard L. Sutton, M.D., Sc.D., LL.D., F.R.S., Professor of Dermatology, University of Kansas, and Richard L. Sutton, Jr., M.D., A.M., L.R.C.P., Assistant in Dermatology, University of Kansas. 1433 pages. Illus. Price, cloth, \$12.50. St. Louis: C. V. Mosby Company, 1935.

PRACTICAL ENDOCRINOLOGY. Max Goldzieher, M.D., Endocrinologist, Gouverneur Hospital, New York City. 326 pages. Illus. Price \$5.00. New York: D. Appleton-Century Co., 1935.

Practical Endocrinology by Max Goldzieher is very well and interestingly written. The author starts at the beginning of the book to deal with the function of various endocrine glands, and then takes up definite symptoms and physical defects, and their relation to glandular disturbances.

In the last half of the book a good deal of attention is paid to the treatment of these conditions and the glands that are definitely at fault.

The discussions in the book are short, complete, and very much to the point, so that one can obtain a good deal of knowledge in a very short time.

The illustrations are very well done, and add very much to the effectiveness of the book.

ADAM M. SMITH, M.D.

MINOR SURGERY IN GENERAL PRACTICE. By W. T. Gibb, M.D., Consulting Surgeon, City Hospital and Neurological Hospitals, New York City. 429 pages. Illus. Price, \$5.00. New York, P. B. Hoeber, 1934.

This is the first of a series of monographs for the general practitioner prepared under the editorial supervision of Dr. T. L. Stedman. Books on pediatrics, differential diagnosis and therapeutics by other authors are in preparation. Dr. Gibb is consulting surgeon to the City, Central and Neurological hospitals in New York City. His handbook discusses the management of such cases as are treated by the practitioner with the surgical instruments ordinarily carried in his handbag and the commercially prepared equipment supplied or obtainable by the local druggist. Varicose veins, bandages, anesthesia, accidental injuries or inflammations and the removal of minor growths, are discussed as well as such physical defects including fractures and dislocations as can be cared for by the local physician.

The handbook should be valuable especially to the recent graduate who locates away from a hospital center and who realizes that neglected minor surgery can develop into major and sometimes embarrassing surgery.

HAMLIN MATTSOON, M.D.

BODY MECHANICS IN THE STUDY AND TREATMENT OF DISEASE. Joel E. Goldthwait, M.D., L. T. Brown, L. T. Swain, and J. G. Kuhns. 281 pages. Illus. Price, \$4.00. Philadelphia: J. B. Lippincott Co., 1934.

In this little book much of Goldthwait's previous writings on this subject are summarized in readable and handy reference form.

The importance of posture in the treatment and prevention of disease is emphasized. Particularly worthwhile are the sections on backache and arthritis, both of which the authors feel can be aided by correction of faulty body mechanics. Exercises are clearly outlined and simplified for instruction.

A plea is made for the rehabilitation of the chronic invalid who is so often neglected after the acute manifestations of his disease have subsided. The book is a helpful contribution to a much neglected field.

S. W. SHIMONEK, M.D.

MINNESOTA MEDICINE